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Please visit www.sternpinball.com
For part numbers and mechanical drawings.

Stern Pinball machines are assembled in Melrose Park, Illinois, USA; each pinball machine has unique characteristics that make it a one of a kind American made product. Each machine will have variations in appearance resulting from differences in the machine's particular wood parts, individual silk screened art and mechanical assemblies. Stern Pinball has inspected each game element to insure it meets our quality standards.

Pinball Service Game Manual

Please call, eMail or visit us online for technical support, questions or comments regarding this pinball game.

Go to www.sternpinball.com and
click Tech. Support & Parts Sales



Find Service Game Manual (with updates), Game Code,
Appendixes, Coin Cards, Service Bulletins and much more!

• Toll-Free: 1-800-KICKERS (542-5377) or 1-708-345-7700 • eMail: parts.service@sternpinball.com •

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November 2012

SPI Part Number
780-50D3-00

HOW TO UPDATE YOUR GAME CODE FOR S.A.M. SYSTEM MACHINES

USB Compatible Data Storage Device (Thumb, Flash or Jump Drives) required to copy game code into system.
S.A.M. System compatible, tested & SPI approved USB Data Storage Devices 128MB+
available through your local distributor. Ask for **SPI Part Number 970-0128-00**

* to get the Data Storage Device with the latest Game Code copied to it, add "game title" to above part number.

STYLE, COLOR, SIZE AND MANUFACTURER SUBJECT TO CHANGE.

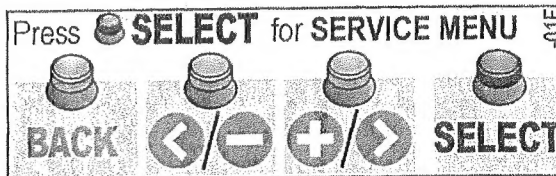
Game Code is subject to change. Update this game with the latest code downloaded from our website, from another game or order through your local distributor (use SPI PN + name above).

Upon power-up the display will describe the version of code installed in your game. When directed to do so (via Service Bulletin or website announcement) you will need to update your code ... with the **BOOT FLASH EPROM*** installed, here's how:

- STEP 1** Open the Back Box and locate the **8-Position Dip Switch (SW1 on the CPU/Sound Board)**.
- STEP 2** Switch Dip Switch #8 to 'ON'.
(***BOOT FLASH EPROM** must be installed.)
- STEP 3** Press the **White Reset Button (S1 RESET on the CPU/Sound Board)** or Power Cycle the game **OFF/ON** (ON/OFF Switch is located on the outside of the cabinet bottom, front right).

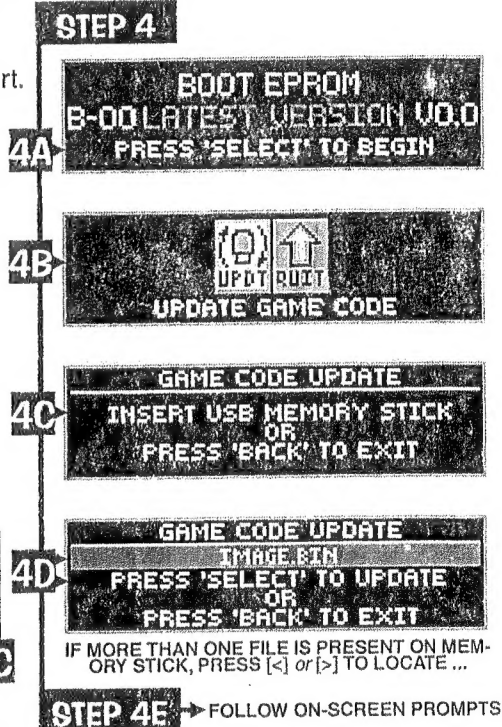
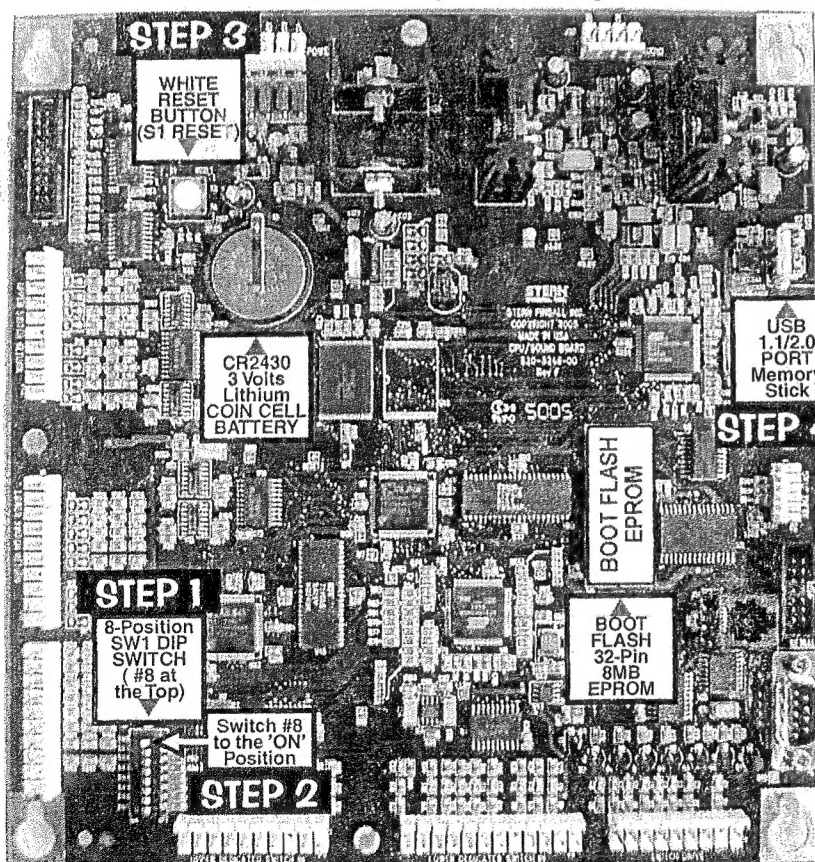
STEP 4 Using the **4-Button Service Switch Set** (inside the Coin Door):

- 4A } Press [SELECT] to begin.
- 4B } With the "UPDT" Icon highlighted, press [SELECT].
- 4C } Insert the Data Storage Device [w/latest file(s)] into the USB Port.
- 4D } If more than one file is present on the Data Storage Device, press [<] or [>] to locate your file. Press [SELECT] to update.
- 4E } Follow on-screen prompts.



- **Green Button**
Press to move < Left , Right >.
- **Red Buttons**
Press to - Decrease or + Increase values or to change settings.
- **Black Button**
Press to Enter Select (or 'OK').

CPU/Sound Board (S.A.M. System)

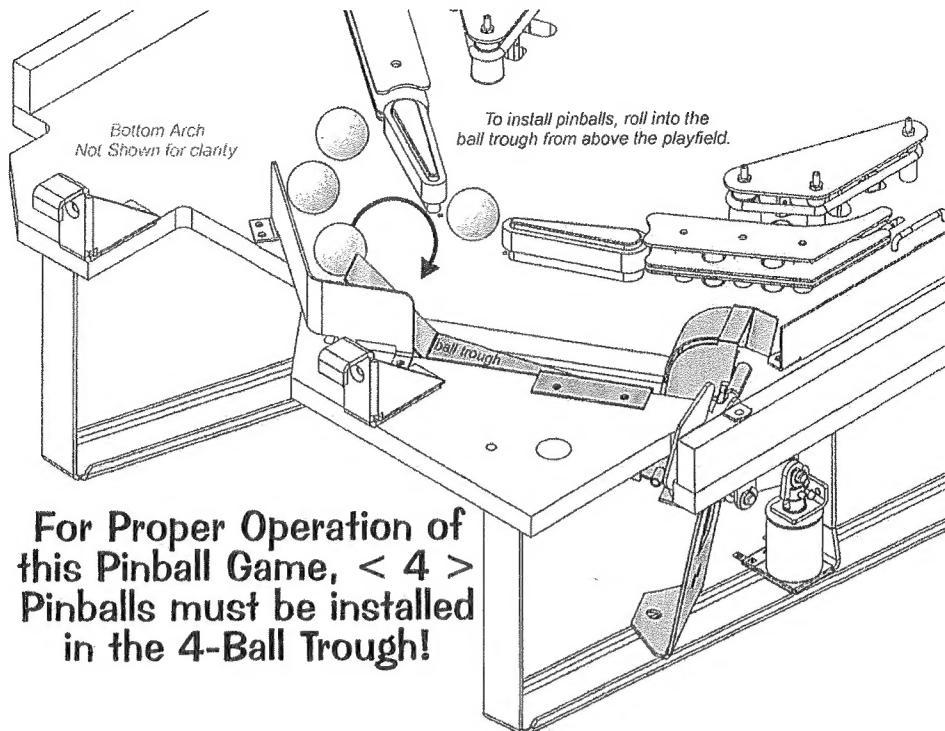


You can also retrieve your latest code from another game! From the **USB MENU** via the **UTILITIES MENU**, select the **"BKUP"** Icon instead and download to your Data Storage Device.



! Quick Tip ~ Try backing up your current code prior to installing your new code, just in case your Data Storage Device file was corrupted by a computer glitch while you were copying /

Got confused? Comments? Questions? Call Technical Support at 800-542-3377 or 708-345-7700 (Option 1).



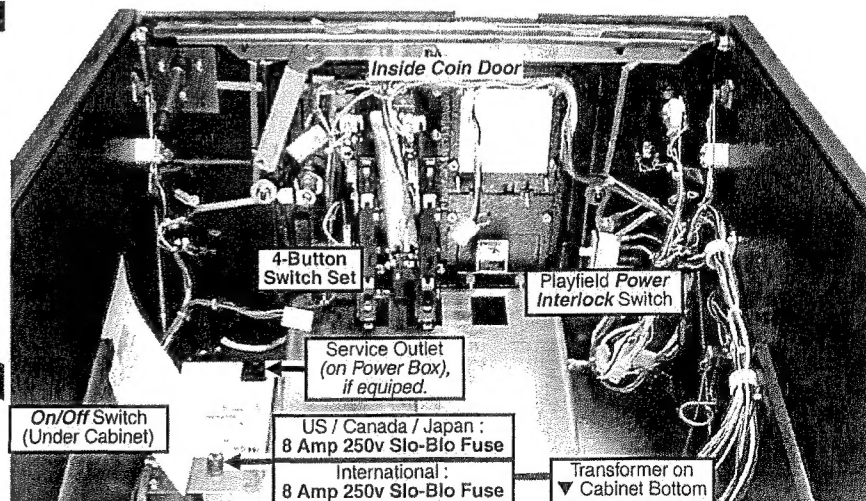
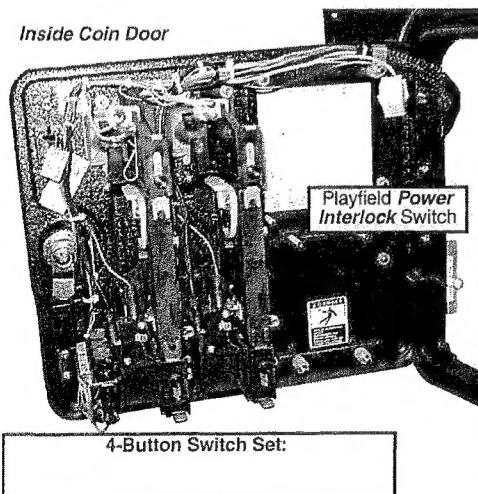
**For Proper Operation of
this Pinball Game, < 4 >
Pinballs must be installed
in the 4-Ball Trough!**

Backbox Fuses*, Cabinet Fuses, Playfield Fuses and Cabinet Switches

**Note: The CPU/Sound PCB
does not have fuses.*

QUICK REFERENCE FUSE CHART									
3/4A S.B. 200-5000-17 3A S.B. 200-5000-08 4A S.B. 200-5000-06 5A S.B. 200-5000-01 7A S.B. 200-5000-03 8A S.B. 200-5000-05									
BACKBOX FUSES					CABINET FUSES				
I/O POWER DRIVER BOARD					POWER (SERVICE OUTLET) BOX				
with RED LED STATUS INDICATORS (if any RED LED is OFF, check the fuse)									
F1	5A S.B.	5.7vac-G.I. Lamps	[BROWN-WHITE-WHT-BRN]		8A S.B.	110-120V Main Line US / Canada / Japan			
F2	5A S.B.	5.7vac-G.I. Lamps	[YELLOW-WHITE-YEL Circuit]		5A S.B.	220-240V Main Line International			
F3	5A S.B.	5.7vac-G.I. Lamps	[GREEN-WHITE-GRN Circuit]		PLAYFIELD FUSES				
F4	5A S.B.	5.7vac-G.I. Lamps	[VIOLET-WHITE-VIO Circuit]						
F5	7A S.B.	50VDC Coils / Flippers	[48VAC feed to BRDG 1]		FLIPPER OR SPECIAL APPLICATION				
F6	3A S.B.	24vac- Motor or Special Application							
F7	4A S.B.	50VDC Magnet(s) or Special Application			<i>(Coil Fuses are located under the playfield near assembly.)</i>				
F8	3A S.B.	50VDC Coils							
F9	8A S.B.	18VDC Control Lamps	[13VAC feed to BRDG 4]		3A S.B.	50VDC R. Flipper [BLU-YEL-WHT-YEL]			
F10	5A S.B.	20VDC Coils / Flashers	[16VAC feed to BRDG 2]		3A S.B.	50VDC L. Flipper [GRY-YEL-WHT-YEL]			
F11	4A S.B.	5VDC Logic Power	[8VAC feed to BRDG 5]		3A S.B.	50VDC Additional Flipper Coil, if used			
F12	5A S.B.	12VDC Audio	[19VAC feed to BRDG 3]		3A S.B.	50VDC Spcl. Application Coil, if used			
F13	5A S.B.	12VDC Audio	[19VAC feed to BRDG 3]		<i>For location & more details on fuses, see Sec. 5, Chp. 2</i>				
ALL FUSES ARE 250V S.B. (SLO-BLO) SEE FUSE OR TABLES FOR AMP RATING CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE FUSE WITH IDENTICAL ELECTRICAL RATING!									
Stern Pinball®, Inc. ©2008					820-6384-00 Rev C				

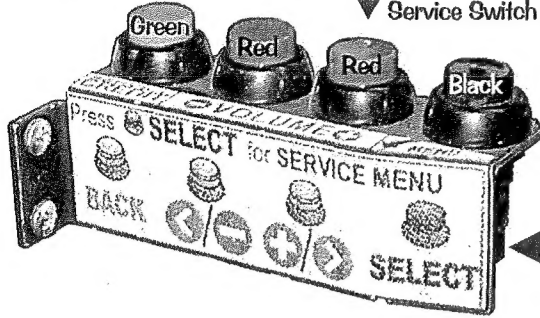
Inside Coin Door



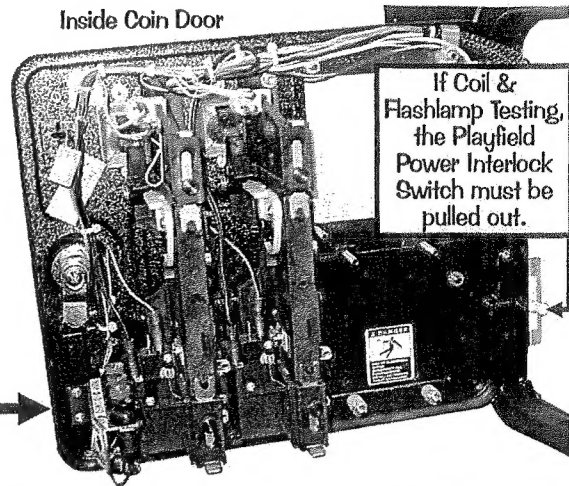
Service Switch X4 Set Access & Use

The 4-Button Service Switch Set provides access for **three (3) functions** available for your use: 1: **SERVICE CREDIT**, 2: **VOLUME** [-] / [+] and 3: **SERVICE MENU**.

▼ Service Switch X4 Set ▼



Inside Coin Door



To access any of these **three (3) functions** you must first open the **Coin Door** (see pictorial above) with the Game in the **Attract Mode** (not already in any Function or Menu stated below) and then follow below.

Pushing the **GREEN BUTTON** first.

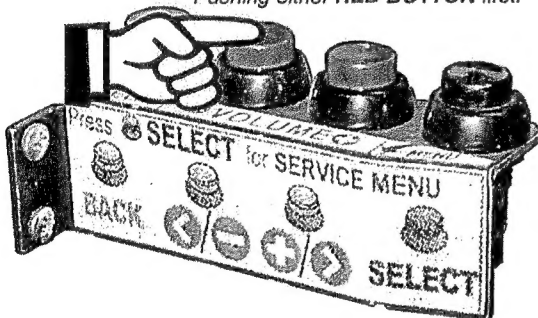
◀ Function 1: SERVICE CREDITS MENU

Pushing the **Green** [**SERVICE CREDIT**] Button first, adds a **Service Credit** per push (will not affect your audits as "paid" credits). This is useful for the technician to test games in regular play without affecting the game audits. Each depression adds **1 credit**; up to **50 credits** can be applied. **Standard Adjustment 23, Credit Limit**, determines this, however, it can be changed from 04-50; for details see the **Adjustments Section**.

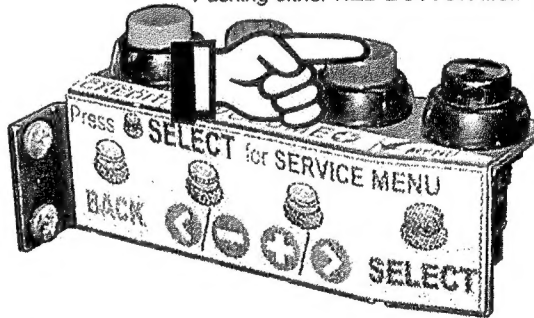
Note: Once your credits are added, this menu will **automatically exit** a few seconds after the last button depression or when the **Green** [**BACK**] or **Black** [**SELECT**] Button is pushed. This function is disabled if **Standard Adjustment**

38, Free Play, is set to **YES**. The **Service Credits** are limited to the **Credit Limit** in addition to any paid credits present in the game (e.g. If the **Credit Limit** is 30, with 8 paid credits present, only 22 Credits can be applied.)

Pushing either **RED BUTTON** first.



Pushing either **RED BUTTON** first.



▲ Function 2: VOLUME MENU ▲

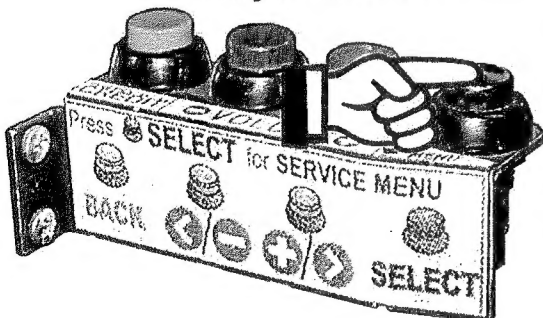
Pushing either of the **Red** [**VOLUME**] Buttons first, enters the **VOLUME MENU**. While in this Mode, to **DECREASE** the volume, hold down or depress the **1st Red** [**< / -**] Button until desired the volume is achieved; to **INCREASE** the volume, hold down or depress the **2nd Red** [**+ / >**] Button until the desired volume is achieved.

Note: The volume can be set between 0-63; Once your adjustments are made, this menu will **automatically exit** a few seconds after the last button depression or when the **Green** [**BACK**] or **Black** [**SELECT**] Button is pushed.

Pushing the **BLACK BUTTON** first.

◀ Function 3: SERVICE MENU

Pushing the **Black** [**SELECT**] Button first, enters the **SERVICE MENU**. Once in, navigate through all menus by depressing the **Service Menu Buttons**. Use the **Red** [**< / -**] or [**+ / >**] Buttons to move **LEFT / RIGHT, NEXT/PREVIOUS** (audits/adjustments) or to **INCREASE / DECREASE** an adjustment (setting). Use the **Black** [**SELECT**] Button to select a highlighted **Icon**, move to the next line of text or to answer "**OK**" where applicable. Use the **Green** [**BACK**] Button to exit or escape back.



DIAGNOSTIC AIDS

50V / 20V DISABLED
CLOSE COIN DOOR
OR PULL INTERLOCK SWITCH
TO RESTORE POWER

'escape' **Green [BACK] Button** will remove the alert display. Initial display presentation is accompanied by 3 audible tones (the bright display warning will go dim after approximately 30 seconds).

OPERATOR ALERT!
AUTO PLUNGER
DEVICE MALFUNCTION

also appear if a switch associated with a device (e.g. Ball Trough, Auto Plunger, etc.) is stuck closed (caused by a switch jam or stuck ball); the game will activate the device a predetermined number of times and if the problem is still detected, this device or switch will be noted in **Switch Alerts and/or Technician Alerts**.

VO.00 GAME NAME
SYS. 0.00 HDW. 0
SERVICE MENU *
USE -/+ TO VIEW TECH. ALERTS

Upon entering the **SERVICE MENU**, if an asterisk " * " is displayed after the words "SERVICE MENU," the game has detected possible faulty devices, switches and/or missing pinballs. Press the either of the **Red Buttons** (short-cut to the **TECHNICIAN ALERTS MENU**) or continue into the **SERVICE MENU** (press the **Black Button** again), select the "DIAG" Icon and "TECH" Icon for the **Technician Alerts** information.

CPU DIP SWITCH SETTINGS

The 8-Pos. Dip Switch [SW1] is on the CPU/Sound Board (between Conn. J3 & J13, lower left corner)

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
USA	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Germany	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Russia	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Australia	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Greece	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
So. Africa	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Austria	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Italy	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Spain	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Belgium	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Japan	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Sweden	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Canada 1	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Lithuania	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Switzerland	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Canada 2	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Middle East	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Taiwan	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Croatia	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Netherlands	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
UK	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Denmark	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
New Zealand	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU/SND PCB SETTING:	Pos.	1	2	3	4	5	6	7	8
UPDATE CODE	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Finland	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Norway	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
France	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Portugal	ON	▲	▲	▲	▲	▲	▲	▲	▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

Note: Slide Dip Switch 8 to Position **ON** (with Dip Switches 1-7 in the **OFF** Position) only to reboot the game with the latest version **BOOT EPROM** installed at **U9** on the CPU/Sound Board (S.A.M. System only). Currently, this is also the procedure to update your game with the latest software code update file. For the latest version, visit our website. If you have questions about updating your game code, call Technical Support for assistance.

Service Menu Introduction

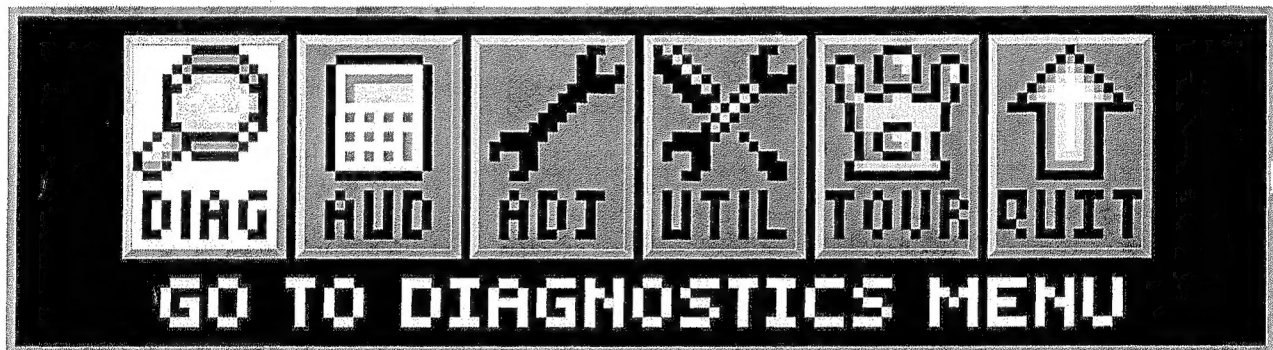
Important: The **Switch Bracket** holds the **Playfield Power Interlock**. It is located just inside the **Coin Door** frame (see pictorial of the **Coin Door** on the previous page). The **Button Switch** for the **Playfield Power Interlock Switch** must be pulled out for electro-mechanical device testing or diagnostic purposes (this is required). If this button is pushed in, the **Playfield Power** is disabled while the **Coin Door** is **OPEN**.

To get into the **SERVICE MENU MODE** review "**Function 3: SERVICE MENU**" on the next page. After Power-Up, push down the **Black [SELECT] Button** to begin. Looking at the display you will momentarily see "**SERVICE MENU**" followed by the **MAIN MENU**:



Use the **Red [</-] / [+/>] Buttons** to move the selected **Icon** left or right, and the **Black [SELECT] Button** to activate the selected **Icon**.

The **MAIN MENU** now appears with the "**DIAG**" **Icon** (**GO TO DIAGNOSTICS MENU**) highlighted:



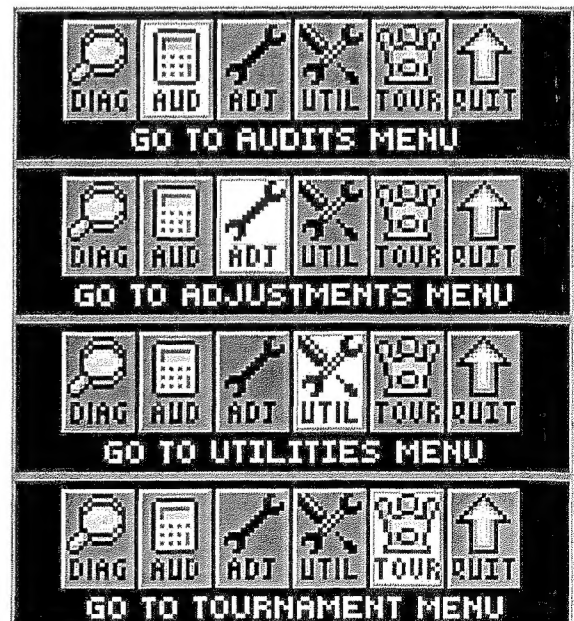
As the operator views the Menu Screen(s), the **MORE MORE** symbols indicates that there are more **Icons** to select in each direction. The **Icon** selected will blink. Pushing the **Black [SELECT] Button** will select the **Icon** and the Menu Screen will change to the menu selected. Select the **Green [BACK] Button** to move backwards through the menu levels. Press the **Green [BACK] Button** repeatedly or select the "**QUIT**" **Icon** to completely exit the **SERVICE MENU** Mode.

View the **SERVICE MENU Icon Tree** on the next pages for a complete overview of all menus used in this system. The "**HELP**" **Icon** provides an explanation of **ICON** usage or any other information in the Menu where the "**HELP**" **Icon** was selected (when available).

DIAG: GO TO DIAGNOSTICS MENU
AUD: GO TO AUDITS MENU
ADJ: GO TO ADJUSTMENTS MENU
UTIL: GO TO UTILITIES MENU
 (INSTALLS, CUSTOM MSG., CUSTOM PRICING, SET TIME, RESET & USB)
TOUR: GO TO TOURNAMENT MENU (START TOURNAMENT, VIEW TOURNAMENT DATA, SIGN MESSAGES)

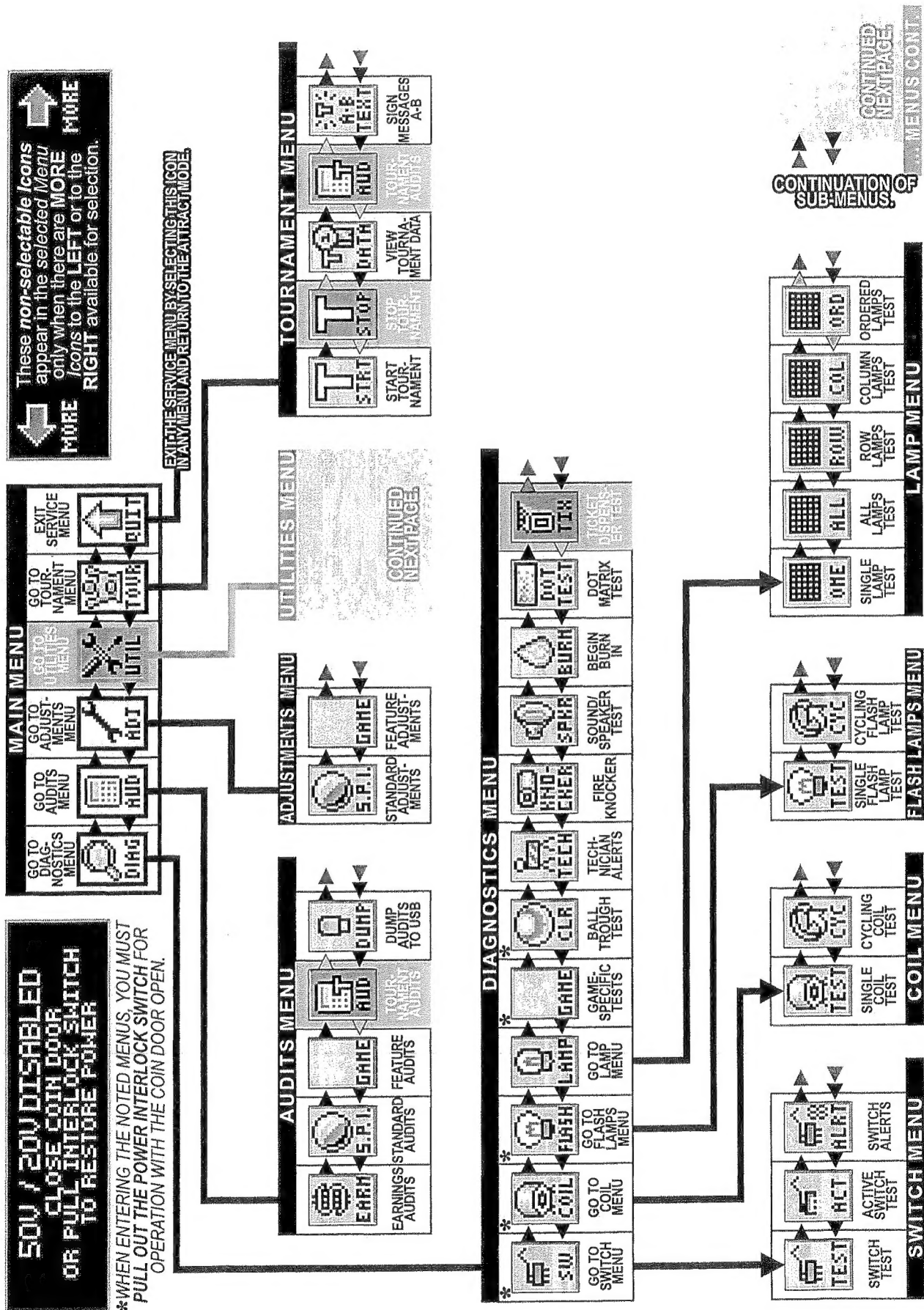
>> TO UPDATE THE GAME CODE, REVIEW THE STEPS ON THE INSIDE FRONT COVER OF THIS MANUAL.

Use both the manual and the display to help customize, troubleshoot and/or diagnose faults, if any.

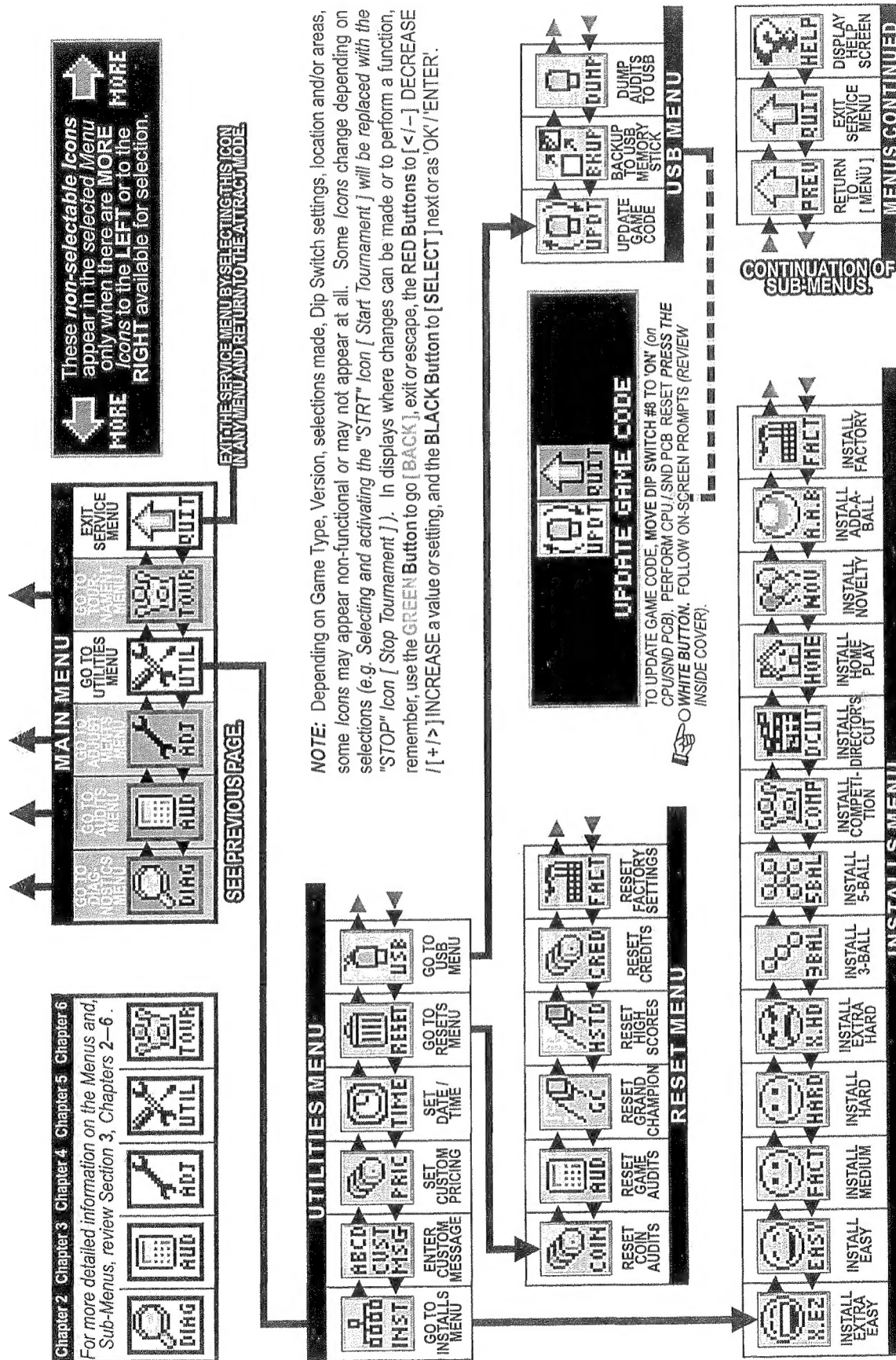


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Pinball Service Menu Icon Tree



Pinball Service Menu Icon Tree Continued

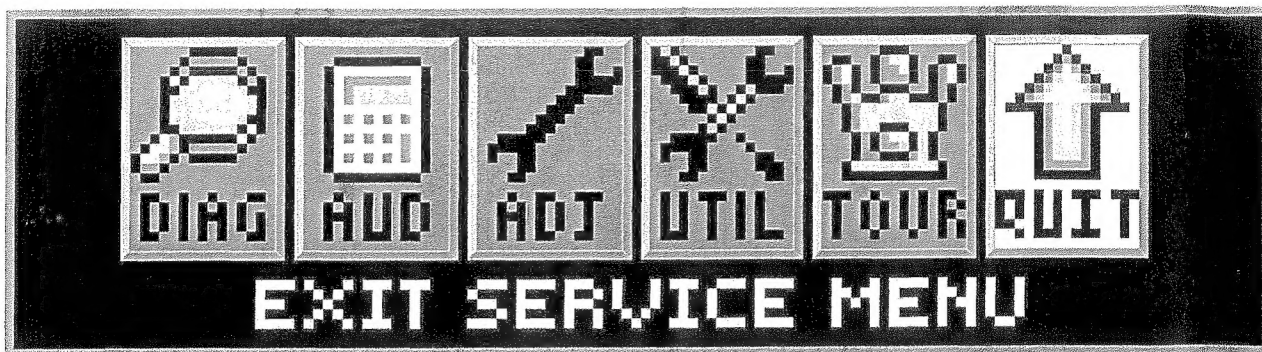


Note: Press [SELECT] to Install; Press [BACK] to cancel. After selection of any of the Install Icons, the request is installed and returns to the Install Menu. The last icon activated before exiting this menu will supersede any previous icon selected in the group.



Exit Service Menu

In the **MAIN MENU** and in all **SUB-MENUS** (where the "QUIT" Icon is present), if the "QUIT" Icon is selected and activated, or the Green [**BACK**] Button is selected repeatedly (depending on which sub-menu you're in...), the **SERVICE MENU** Session will be exited and returned to the **Attract Mode**.



Turning the game on/off will start the *Power-Up Routine*. Upon **Power-Up**, the DISPLAY will indicate the COUNTRY, FILE VERSION and LANGUAGE(S) installed. LANGUAGE/COUNTRY: change via Dip Switch.

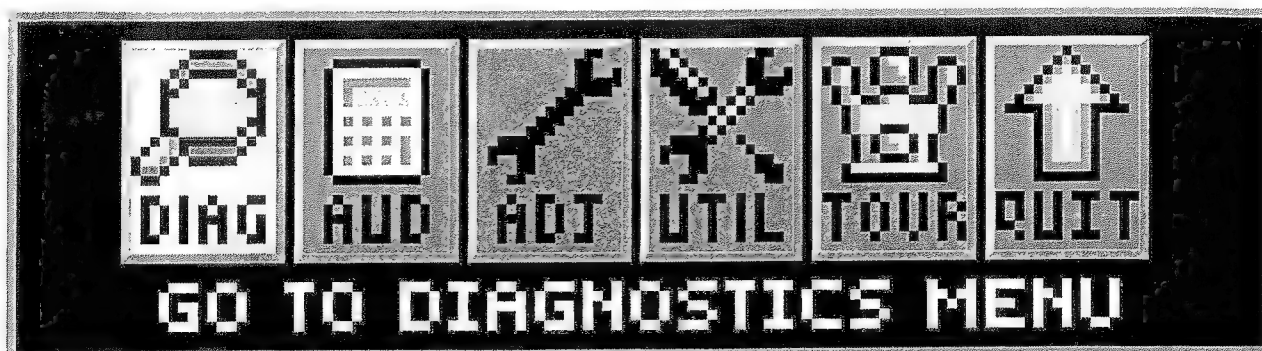


The below **Problem / Solution Table** was designed to answer some common problems frequently asked.

Problem / Solution Table

PROBLEM	SOLUTION
Will not enter the SERVICE MENU after depressing the Black [SELECT] Button.	<ul style="list-style-type: none"> Check the Service Switches [GREEN, RED (x2) & BLACK Buttons] for loose connections or bad ground. Check the associated wiring harness to/from the CPU/Sound Board, Connector J13. Check CPU/Sound Board for possible failure.
All Service Buttons [•••• Buttons] appear nonfunctional.	<ul style="list-style-type: none"> Check the Service Switches wiring harness for poor or no connection and/or broken wires.
The Green Button in the Attract Mode will not enter the SERVICE CREDITS MENU to add Service Credits.	<ul style="list-style-type: none"> Check to make sure the Game is not in "Free Play." <i>If the game is set to Free Play, adding Service Credits is not required.</i> Check the Service Switches wiring harness for poor or no connection and/or broken wires.
The Display "blanks out."	<ul style="list-style-type: none"> Check the Dot Matrix Display for loose wiring harness for poor or no connection and/or broken wires. Check F1 (3/4A Fuse) on the Display Power Supply Board. <i>Refer to the Yellow Pages (SCHEMATICS & TROUBLESHOOTING).</i>
Icons "scroll" along continuously in the MAIN MENU .	<ul style="list-style-type: none"> Check for a stuck switch on either of the Red Buttons.
The Start and Flipper Buttons do not select or activate Icons in the SWITCH TEST MENU.	<ul style="list-style-type: none"> This is normal. These switches are deactivated, as they are a part of the Switch Test. <i>Refer to the Diagnostics Section (GO TO DIAGNOSTICS MENU, Switch Test).</i>
Can't move selection of Icon with the Left and/or Right Flipper Buttons .	<ul style="list-style-type: none"> Check the Flipper Buttons for loose connections or bad Ground and refer to Section 5, Chapter 2, Playfield Wiring, #-Flipper Circuit Wiring Diagram. This is normal <i>only</i> in <i>Diagnostic's Switch & Active Switch Tests</i> (see previous Problem).
Some Icons appear non-functional in the MENU or missing.	<ul style="list-style-type: none"> Some functionality of the Service Menu may not have been completed during development. If exists, it should only be a non-critical function, such as the "HELP" Icon, which will explain the usage of icons. When completed, a software update will correct the problem. Software updates are announced via Service Bulletins (if critical) and on our website http://www.sterpinball.com/GAME-code.shtml; view the Game Code Library Message Board Marquee or click Previous Messages for past announcements.
In COIL TEST MENU, the coils and flashlamps <i>do not</i> fire after pressing the Black [SELECT] Button.	<ul style="list-style-type: none"> Ensure the POWER INTERLOCK SWITCH is <i>pulled out</i> (see the start of this Chapter).
In the SERVICE MENU , the volume cannot be adjusted with either of the Red Buttons .	<ul style="list-style-type: none"> The Volume adjustment can only be made when in the Attract Mode (see the start of this Chapter).
In the SERVICE MENU , the display seems to lock up, or the Help Display appears to be non-functional.	<ul style="list-style-type: none"> If you cannot clear the situation by exiting back one Menu, exit completely out of the SERVICE MENU, and re-enter. If the problem persists, call Technical Support for additional help.

**IF YOU NOTE ANY OTHER PROBLEMS or
HAVE ANY SYMPTOMS NOT DESCRIBED
ABOVE, PLEASE CALL TECHNICAL
SUPPORT 800-542-5377 (708-345-7700
OPTION #1), SO WE MAY ASSIST YOU.**



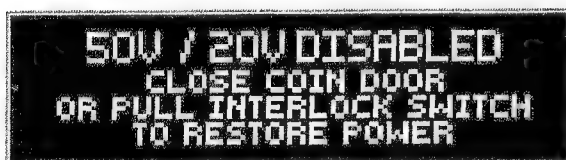
To initiate, from the **MAIN MENU**, select the "DIAG" *Icon*. The **DIAGNOSTICS MENU** provides tests for switches, coils, flash lamps, lamps, sounds and dots in the Dot Matrix Display. Each feature may be tested manually or automatically after entering the **SERVICE MENU** (see *Service Menu Introduction Section*).

The [**CYCLING COIL TEST**] / [**FLASH LAMP TEST**] may be used for a quick verification of automatic test functions. The [**SWITCH TEST**] / [**SINGLE COIL TEST**] / [**SINGLE LAMP TEST**] / [**ALL LAMPS TEST**] / [**ROW LAMPS TEST**] / [**COLUMN LAMPS TEST**] / [**FLASH LAMP TEST**] may be used for troubleshooting.

All **DIAGNOSTICS MENU** *Icons* and there usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type; Version, selections made, Dip Switch settings, location and/or areas, some *Icons* may appear non-functional or may not appear at all. Some *Icons* change depending on selections (e.g. Selecting and activating the "STRT" *Icon* [**Start Tournament**] will be replaced with the "STOP" *Icon* [**Stop Tournament**]). *Icons* and/or *functions*, *order* and *operation* are **subject to change**.

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [**BACK**], exit or escape, the **RED Buttons** to [**< / -**] **MOVE BACK / LEFT / DECREASE** / [**+ / >**] **MOVE FORWARD / RIGHT / INCREASE** a value or setting, and the **BLACK Button** to [**SELECT**] next or as "OK / ENTER / ENERGIZE."

Important: Upon **Power-Up** (Game CPU Reset) or opening the **Coin Door** watch the **Display** for any **Alerts**.*



This **audible / visual alert display** is shown when the **50V / 20V Power** is disabled (by opening the **Coin Door**). **PULL OUT THE INTERLOCK SWITCH ONLY WHILE IN THE SERVICE MENU FOR COIL OR SWITCH TESTING & BURN-IN WHEN THE COIN DOOR IS REQUIRED TO STAY OPEN FOR SERVICE BUTTON USE!** Pulling out the Power Interlock Switch or

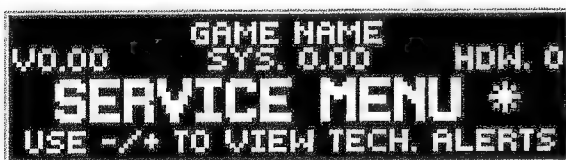
pressing the 'escape' **Green [BACK] Button** will remove the alert display. Initial display presentation is accompanied by 3 audible tones (the bright display warning will go dim after approximately 30 seconds).



This **alert display** is shown momentarily during **Game Mode** or **Power-Up** to alert the operator of a device malfunction (device or mechanism doesn't energize or is energized repeatedly).

OPERATOR ALERT! works by monitoring any switch activated device that has the potential to trap a ball when disabled (e.g. in the Shooter Lane, Scoop or Eject Holes, etc.). This alert can

also appear if a switch associated with a device (e.g. Ball Trough, Auto Plunger, etc.) is stuck closed (caused by a switch jam or stuck ball); the game will activate the device a predetermined number of times and if the problem is still detected, this device or switch will be noted in **Switch Alerts** (next page) and/or **Technician Alerts**.



Upon entering the **SERVICE MENU**, if an asterisk " * " is displayed after the words "SERVICE MENU," the game has detected possible faulty devices, switches and/or missing pinballs. Press the either of the **Red Buttons** (short-cut to the **TECHNICIAN ALERTS MENU**) or continue into the **SERVICE MENU** (press the **Black Button** again), select the "DIAG" *Icon*

and "TECH" *Icon* for the **Technician Alerts** information.



CAUTION! Remove all pinballs from the Ball Trough prior to lifting the playfield to it's full upright position for servicing. **PULL OUT** the **Power Interlock Switch** for operation. To eject pinballs, select the "DIAG" *Icon* from the **MAIN MENU** to enter the **DIAGNOSTICS MENU**. Select the "CLR" *Icon* to enter the **BALL TROUGH TEST MENU**. Press the **Black [SELECT] Button**. To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**. This feature also useful to retrieve a pinball for game testing in **Switch** or **Coil Tests**.



Go To Switch Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "SW" *Icon*. Switches are configured in an 4 X 16 Matrix of Rows [Switch Drives] and Columns [Sw. Returns] with up to **64** possible switches. Dedicated Switches are configured in a 2 X 16 Matrix of Rows [Dedicated Sw. Drives / Ground] and Column [Ded. Switch Returns] with up to **32** possible dedicated switches (*includes the 8 dip switch positions*). The **SWITCH TEST MENU** consists of three (3) parts: **Switch & Active Switch Tests** and **Switch Alerts** to test *all* switches.

Reminder: The **Flipper & Start Buttons** (part of Switch Tests) are temporarily disabled as **Service Menu Navigation Buttons** during these test(s) so they can be tested and shown on-screen. Pressing the **Green [BACK] Button** (Dedicated Switch D-21), Light Green-Black / Black (GND), will exit **Switch Test** or **Active Switch Test**.



Switch Test

To initiate, from the **SWITCH MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open and the activation of coils is required. Upon entering **Switch Test**, you will notice that some switches are already indicated as closed. In the examples, the 4-Ball Trough Switches **#18, #19, #20 & #21** are shown closed (*pinballs at rest in the ball trough*), along with the Flipper E.O.S. Dedicated Switches **D-10 & D-12** (End-of-Stroke Switches are 'normally closed'). If the game has more flippers with E.O.S. Dedicated Switches, CPU Dip Switch Setting *other than 1-8 OFF* or switches stuck closed, more dots will be indicated (*enter Active Switch Test to reveal the names*).

In **Switch Test**, close each switch and observe the display (*switch closure is accompanied by a short audible tone*). In the example, the **Black [SELECT] Button** Dedicated Switch **D-24** is pressed. The Dot Matrix Display will light up (*highlight*) the corresponding dot in the on-screen matrix, display the *switch name*, *switch number* and the *Switch Drive / Return wire colors*. When not closing a switch, the display indicates **NONE** and the last switch number closure. For the Switch Matrix Grid and Dedicated Switch Grid, see **Find-It-In-Front: Dr. Pinball, DR. 4** or escape out of this test and enter **Active Switch Test** (*described below*) to view the names of the switches closed. **Note:** Pressing the **Green [BACK] Button** (Ded. Switch D-21), Lt. Green-Black / Black (GND), will exit the **Switch Test**.



CAUTION! COIL MECHANISMS WHEN ACTIVATED HAVE FAST MOVING PARTS! While performing **Switch Test** with the Coin Door closed or open (*with the Power Interlock Switch is pulled out*), **DO NOT USE YOUR FINGER** to test switches which are associated with a coil mechanism such as a Vertical Up-Kicker (*hole with a switch*), Slingshots, Bumpers, etc..



Active Switch Test

To initiate, from the **SWITCH MENU**, select the "ACT" *Icon*. In **Active Switch Test**, if any switches are stuck closed (*or normally closed from the presence of pinball(s) as in the Ball Trough*), the display will flash the corresponding dot(s) in the on-screen matrix, display the *name* and the *Switch Drive / Return wire colors*. If more than one switch is closed, the switch information will change with each switch. This cycle continues until all switches are cleared or until **Active Switch Test** is exited. In the example, the **Black [SELECT] Button** Dedicated Switch **D-24** is pressed and held down. The display will cycle and flash each dot, naming each switch which is closed. To determine the *switch number*, compare the highlighted dot to the same position in the Switch Matrix Grid at the beginning of this manual.



Switch Alerts

To initiate, from the **SWITCH MENU**, select the "ALRT" *Icon*. In **Switch Alerts Menu**, possible inoperable switches are marked with an "X" (**OUT OF SERVICE**). Mark switches **IN** or **OUT OF SERVICE** by pressing the **Black Button** while the intended switch is highlighted and change with either of the **Red Buttons**. Switches which are determined as "OUT OF SERVICE" by the game or manually, will be automatically marked as "IN SERVICE" as soon as the game determines a valid switch closure (*after adjusting, fixing or replacing the switch, then testing/actuating the switch*). **Note:** A **Factory Reset** will also put the switch back "IN SERVICE" in which the game will need to redetermine if the switch should be marked **OUT OF SERVICE**.

Upon entering **Switch Test**, you will notice that some switches are already indicated as 'closed'.



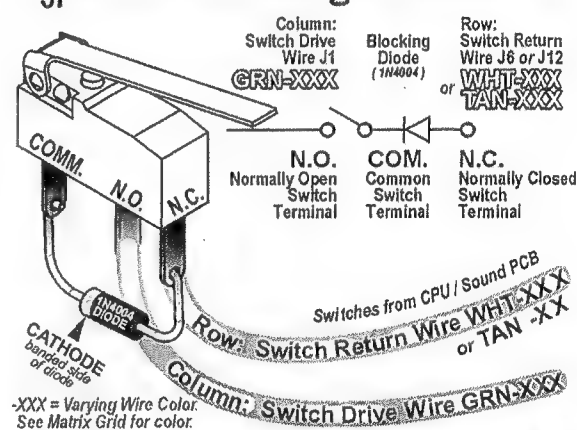
D-24 position is highlighted and accompanied by a short audible tone when pressed.



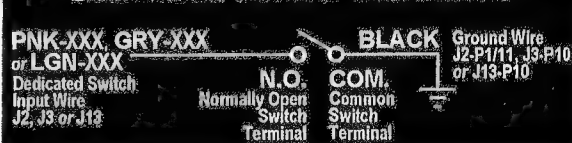
After pressing the switch (to make it close), the display will indicate the last switch number.



Typical Switch Wiring & Schematic



Dedicated Switch Schematic



D-24 is held down. The display will cycle and flash each dot, naming each switch ... closed.



SWITCH MATRIX GRID [#1 - #64] {Switch Locations : next page}

CPU/ Sound Board	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
	IC-U22A	IC-U22B	IC-U22C	IC-U22D	IC-U16A	IC-U16B	IC-U16C	IC-U16D	IC-U36A	IC-U36B	IC-U36C	IC-U36D	IC-U40A	IC-U40B	IC-U40C	IC-U40D
	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN	RETURN
	WHT-BRN	WHT-RED	WHT-ORG	WHT-YEL	WHT-GRN	WHT-BLK	WHT-VIO	WHT-GRY	TAN-BLK	TAN-GRN	TAN-VEL	TAN-GRN	TAN-BLU	TAN-VIO	TAN-VIO	TAN-WHT
	J6-P9	J6-P8	J6-P7	J6-P6	J6-P5	J6-P4	J6-P3	J6-P2	J6-P1	J12-P8	J12-P7	J12-P6	J12-P5	J12-P4	J12-P3	J12-P2
01	S.W. #1	S.W. #2	S.W. #3	S.W. #4	S.W. #5	S.W. #6	S.W. #7	S.W. #8	S.W. #9	S.W. #10	S.W. #11	S.W. #12	S.W. #13	S.W. #14	S.W. #15	S.W. #16
DRIVE	(T)HOR	T(H)OR	TH(O)R	THO(R)						LEFT TOP LANE	CENTER TOP LANE	RIGHT TOP LANE	TESSERACT STANDUP #3	TESSERACT STANDUP #2	TOURN	START
GRN-BRN	515-7568-05 BELOW P.F.	515-7568-05 BELOW P.F.	515-7568-05 BELOW P.F.	515-7568-05 BELOW P.F.			515-7581-05 BELOW P.F.			500-6227-03 BOTTOM P.F.	500-6227-03 BOTTOM P.F.	500-6227-04 BOTTOM P.F.	515-7640-05 BELOW P.F.	515-7640-05 BELOW P.F.	180-5174-00 IN CABINET	180-5174-00 IN CABINET
02	S.W. #17	S.W. #18	S.W. #19	S.W. #20	S.W. #21	S.W. #22	S.W. #23	S.W. #24	S.W. #25	S.W. #26	S.W. #27	S.W. #28	S.W. #29	S.W. #30	S.W. #31	S.W. #32
DRIVE	TROUGH	TROUGH	TROUGH	TROUGH	TROUGH	TROUGH	SHOOTER LANE	LEFT OUTLANE	LEFT RETURN LANE	LEFT SLINGSHOT	RIGHT SLINGSHOT	RIGHT RETURN LANE	RIGHT OUTLANE	LEFT BUMPER	RIGHT BUMPER	BOTTOM POP BUMPER
GRN-RED	180-5119-02 BELOW P.F.	180-5119-02 BELOW P.F.	180-5119-02 BELOW P.F.	180-5119-02 BELOW P.F.	515-0173-00 515-0174-00	515-0173-00 515-0174-00	180-5157-00 BELOW P.F.	500-6227-03 BELOW P.F.	500-6227-04 BELOW P.F.	180-5054-00 BELOW P.F.	180-5054-00 BELOW P.F.	500-6227-03 BELOW P.F.	500-6227-04 BELOW P.F.	180-5015-04 BELOW P.F.	180-5015-04 BELOW P.F.	180-5015-04 BELOW P.F.
03	S.W. #33	S.W. #34	S.W. #35	S.W. #36	S.W. #37	S.W. #38	S.W. #39	S.W. #40	S.W. #41	S.W. #42	S.W. #43	S.W. #44	S.W. #45	S.W. #46	S.W. #47	S.W. #48
DRIVE	INNER LOOP	SHIELD	TARGET	TARGET	TARGET	TARGET			HULK WHEEL OPTO #1	HULK WHEEL OPTO #2	LEFT RAMP EXIT	CENTER SPINNER	TESSERACT WHEEL #1	TESSERACT WHEEL #2	LEFT ORBIT	R. RAMP EXIT
GRN-ORG	180-5087-00 BELOW P.F.	515-7640-02 BELOW P.F.	515-7640-02 BELOW P.F.	515-7640-02 BELOW P.F.					520-6796-00 BELOW P.F.	520-6796-00 BELOW P.F.	500-6775-01 ABOVE P.F.	180-5010-04 ABOVE P.F.	520-6782-00 BELOW P.F.	520-6782-00 BELOW P.F.	500-6227-04 BELOW P.F.	180-5087-00 BELOW P.F.
04	S.W. #49	S.W. #50	S.W. #51	S.W. #52	S.W. #53	S.W. #54	S.W. #55	S.W. #56	S.W. #57	S.W. #58	S.W. #59	S.W. #60	S.W. #61	S.W. #62	S.W. #63	S.W. #64
DRIVE	LOKI LOCK 1	LOKI LOCK 2	LOKI LOCK 3	(H)HULK	H(U)LK	HU(L)K	HUL(K)	HULK PLATE	180-5118-02 BELOW P.F.	500-6889-01 CABINET	180-5148-00 FLIP ASSY.	500-6889-01 CABINET	500-6889-01 CABINET	180-5148-00 FLIP ASSY.	180-5148-00 FLIP ASSY.	180-5148-00 FLIP ASSY.
GRN-VEL	520-6780-01 BELOW P.F.	520-6780-01 BELOW P.F.	520-6780-01 BELOW P.F.	520-5252-04 BELOW P.F.	520-5252-04 BELOW P.F.	520-5252-04 BELOW P.F.	520-5252-04 BELOW P.F.	520-5252-04 BELOW P.F.	180-5118-02 BELOW P.F.	500-6889-01 CABINET	180-5148-00 FLIP ASSY.	500-6889-01 CABINET	500-6889-01 CABINET	180-5148-00 FLIP ASSY.	180-5148-00 FLIP ASSY.	180-5148-00 FLIP ASSY.

« FOR MORE ABOUT DIODE ON TERMINAL STRIPS & DOTS, SEE SECTION 5, CHAPTER 2, PAGES 104-105 »

Wire Color Abbreviations used:

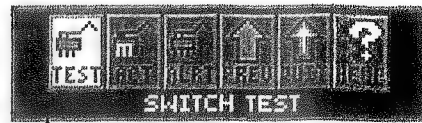
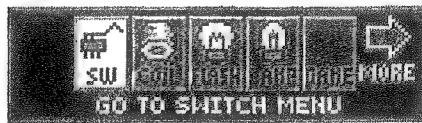
BLK Black BRN Brown GRN Green LGN Light Green ORG Orange PNK Pink RED Red TAN Tan VIO Violet WHT White YEL Yellow

Dedicated Switches [#D-1 - #D-32] {Dedicated Switch Locations : next page}

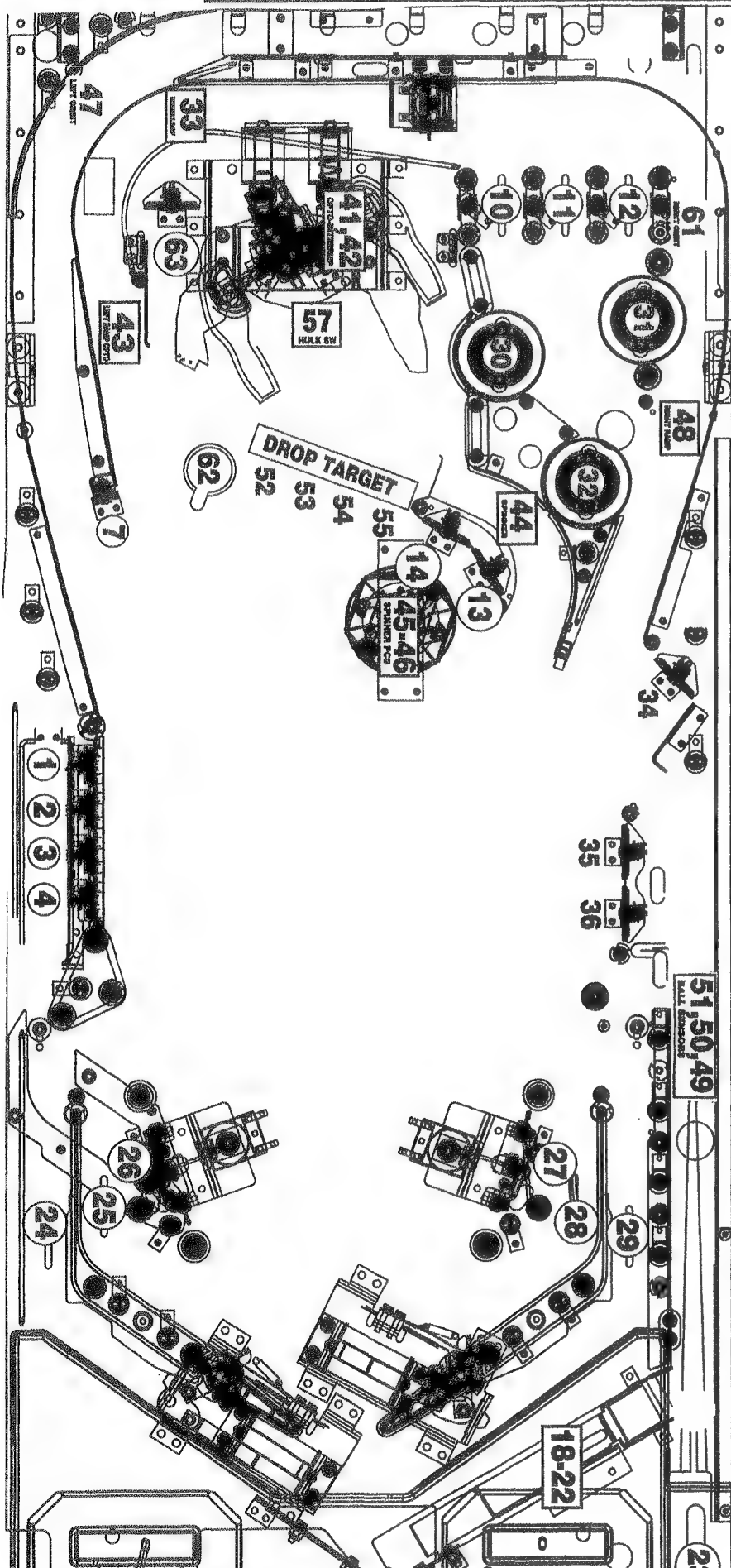
CPU/SND Board	IC-U2	IC-U2	IC-U2	IC-U2	IC-U2	IC-U2	IC-U2	IC-U2	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4
	S.W. D-1	S.W. D-2	S.W. D-3	S.W. D-4	S.W. D-5	S.W. D-6	S.W. D-7	S.W. D-8	S.W. D-9	S.W. D-10	S.W. D-11	S.W. D-12	S.W. D-13	S.W. D-14	S.W. D-15	S.W. D-16
	LEFT COIN SLOT	CENTER COIN SLOT	RIGHT COIN SLOT	FORTH COIN SLOT	FIFTH COIN SLOT	IF USED			LEFT FLIPPER E.O.S.	LEFT FLIPPER E.O.S.	RIGHT FLIPPER E.O.S.	RIGHT FLIPPER E.O.S.	RIGHT FLIPPER E.O.S.	RIGHT FLIPPER E.O.S.	RIGHT FLIPPER E.O.S.	RIGHT FLIPPER E.O.S.
GROUND (BLK) J2-P1/11 & J3-P10	180-5204-00 COIN DOOR	180-5204-00 COIN DOOR	180-5204-00 COIN DOOR	180-5204-00 COIN DOOR	180-5204-00 COIN DOOR	180-5204-00 COIN DOOR	180-5204-00 COIN DOOR	180-5204-00 COIN DOOR	180-5148-00 FLIP ASSY.	180-5148-00 FLIP ASSY.	500-6889-01 CABINET	500-6889-01 CABINET	500-6889-01 CABINET	500-6889-01 CABINET	500-6889-01 CABINET	500-6889-01 CABINET

CPU/SOUND BD. SW1 DIP SWITCH (located between Connectors J3/J13)

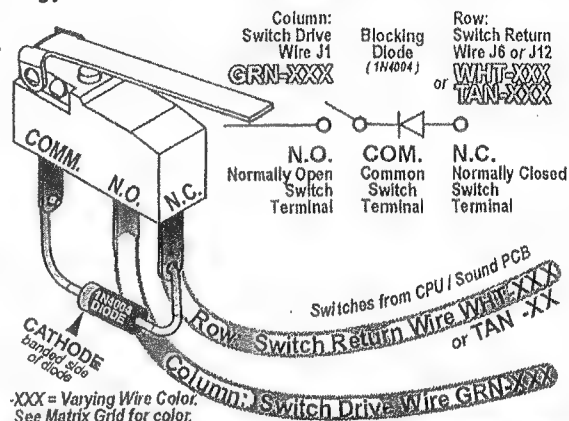
CPU/SND Board	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41
	S.W. D-17	S.W. D-18	S.W. D-19	S.W. D-20	S.W. D-21	S.W. D-22	S.W. D-23	S.W. D-24	S.W. D-25	S.W. D-26	S.W. D-27	S.W. D-28	S.W. D-29	S.W. D-30	S.W. D-31	S.W. D-32
	TILT PENDULUM CABINET	SLAM TILT	TICKET NOTCH		BACK (GREEN)	MINUS (RED)	PLUS (RED)	SELECT (BLACK)	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678
GROUND (BLK) J13-P10			IF USED	180-5192-04 COIN DOOR	180-5192-04 COIN DOOR	180-5192-02 COIN DOOR	180-5192-02 COIN DOOR	180-5192-00 COIN DOOR	S.W. POS. #1 ON	S.W. POS. #2 ON	S.W. POS. #3 ON	S.W. POS. #4 ON	S.W. POS. #5 ON	S.W. POS. #6 ON	S.W. POS. #7 ON	S.W. POS. #8 ON



SWITCH MENU: SWITCH, ACTIVE, SINGLE & SERVICE



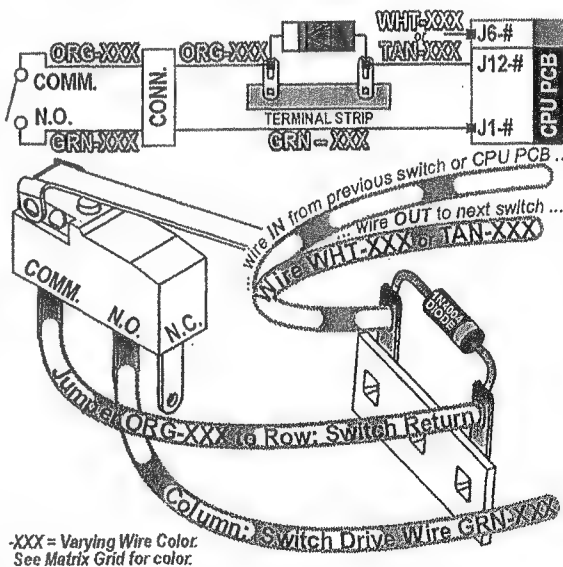
Typical Switch Wiring & Schematic



Dedicated Switch Schematic



Typical Switch Wiring & Schematic ... with Switch Diode on a Terminal Strip (DOT9)





Go To Coil Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "COIL" *Icon*. Coils #01 – #16 are typically High Current Coils (*although Low Current Coils may be used in these positions & will be noted*). Coils #17 – #32 are typically Low Current Coils. Flash Lamps are typically used in positions #25 – #32 (*although Flash Lamps may be used in any position and will be noted*). Auxiliary Coils may be used in positions #33 – #35.

Remember, use the **GREEN Button** to go [**BACK**], exit or escape, the **RED Buttons** to [**< / -**] GO BACK [**+ / >**] GO FORWARD, and the **BLACK Button** to [**SELECT**] ENERGIZE the coil (*solenoid*) or flash lamp.



Single Coil Test

To initiate, from the **COIL MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. Upon entering **Single Coil Test**, you will notice the #1 coil is shown. The Dot Matrix Display will indicate the *coil or flash lamp name, coil (solenoid) or flash lamp number and the Coil or Flash Lamp Power Line / Drive Transistor Control Line wire colors*. To determine the "Pin-Outs" from the I/O Power Driver Board, the Coil Voltage Gauge-Turns (e.g. 23-800) or lamp type (e.g. #89 or #906 Bulb), view the Coils Detailed Chart Table at the beginning of this manual or for more on troubleshooting and diagnosing, see the Yellow Pages (*Schematics & Wiring*).

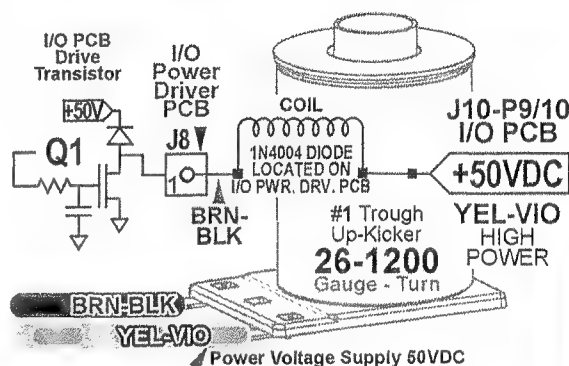


Cycling Coil Test

To initiate, from the **COIL MENU**, select the "CYC" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. The test pulses each regular coil or flash lamp sequentially (*cycling*) on the Playfield and in the Backbox (*if coils or flash lamps are used*). The Dot Matrix Display indicates the same information you will find in **Single Coil Test**.



Typical Coil Wiring & Schematic



Go To Flash Lamps Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "FLASH" *Icon*. The two tests allows the technician to easily spot any burned-out flash lamps and replace them. Unlike **Single Coil Test**, which tests *all* coil (*solenoids*), including flash lamps, **Single and Cycling Flash Lamp Tests**, test only the flash lamps used in the game. Flash Lamps are typically used in positions #25 – #32 (*although Flash Lamps may be used in any position and will be noted*).

Remember, use the **GREEN Button** to go [**BACK**], exit or escape, the **RED Buttons** to [**< / -**] GO BACK [**+ / >**] GO FORWARD, and the **BLACK Button** to [**SELECT**] ENERGIZE the flash lamp.

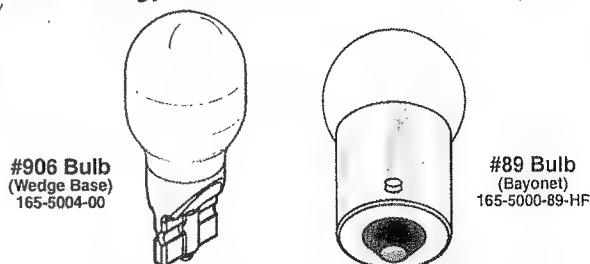


Single Flash Lamp Test

To initiate, from the **FLASH LAMPS MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. Upon entering **Single Flash Lamp Test**, you will notice the first Flash Lamp is shown. The Dot Matrix Display will indicate the *flash lamp name, flash lamp number and the Flash Lamp Power Line / Drive Transistor Control Line wire colors*. To determine the "Pin-Outs" from the I/O Power Driver Board or lamp type (e.g. #89 or #906 Bulb), view the Coils Detailed Chart Table at the beginning of this manual or for more on troubleshooting and diagnosing, see the Yellow Pages (*Schematics & Wiring*).



Bulb Types used for Flash Lamps



Cycling Flash Lamp Test

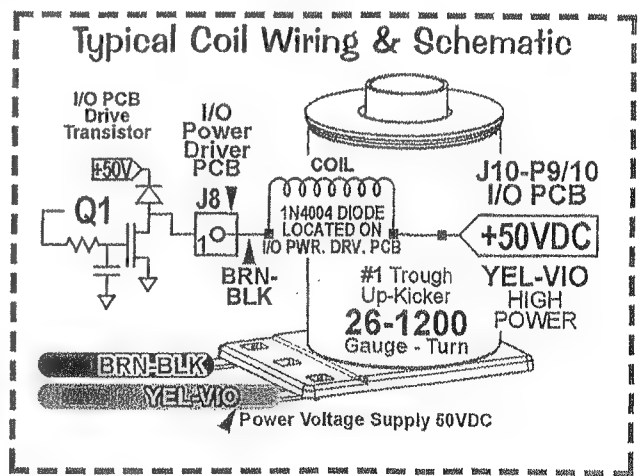
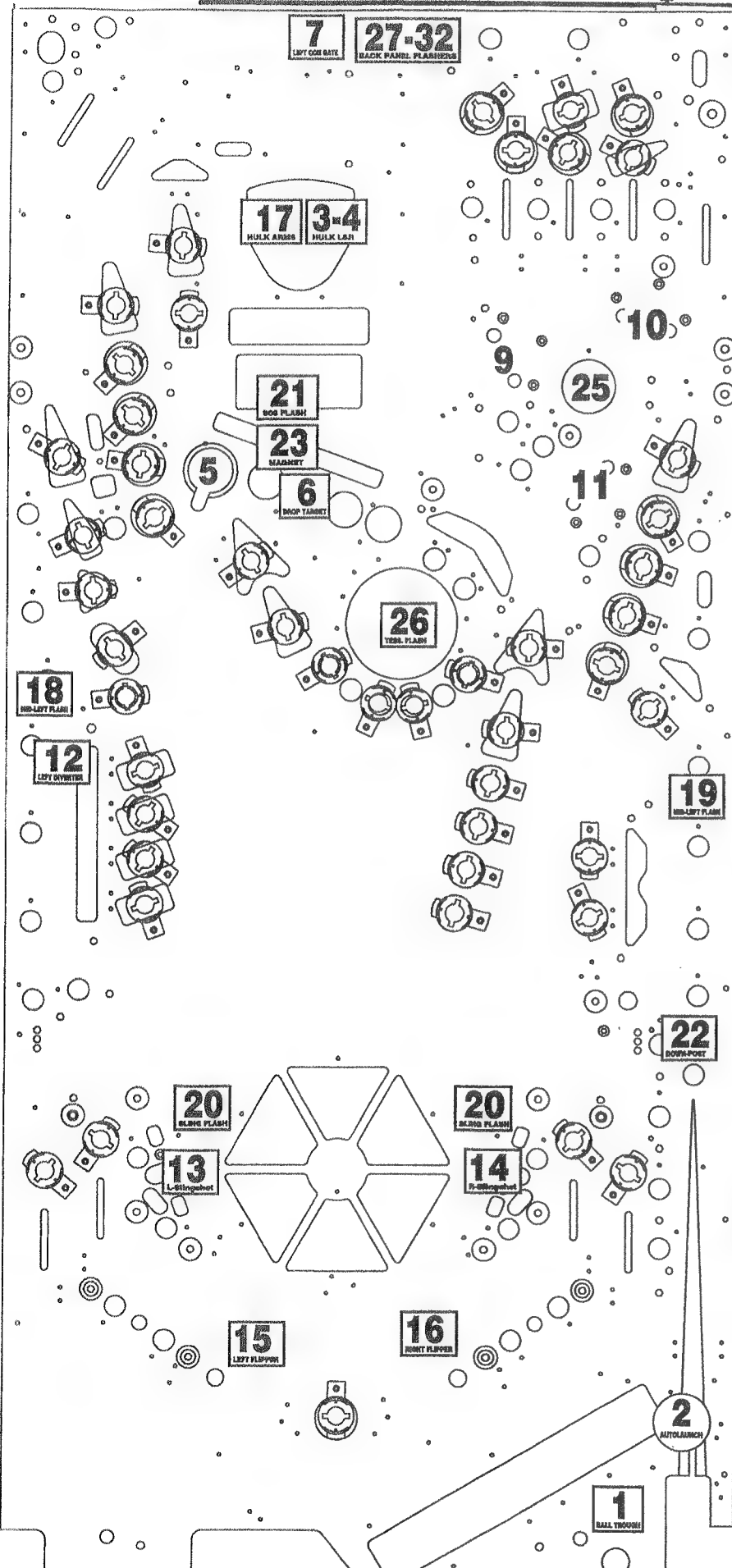
To initiate, from the **FLASH LAMPS MENU**, select the "CYC" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. The test pulses each flash lamp sequentially (*cycling*) on the Playfield and in the Backbox (*if flash lamps are used*). The Dot Matrix Display indicates the same information you will find in **Single Flash Lamp Test**.

COILS DETAILED CHART TABLE

High Current Coils Group 1			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Power Driver	YEL-VIO	J10-P9/10	50VDC	BRN-BLK	J8-P1	28-1200 090-5044-NB
#2	AUTO LAUNCH	Q2		YEL-VIO	J10-P9/10	50VDC	BRN-RED	J8-P3	24-940 090-5036-NB
#3	HULK COUNTER CLOCKWISE	Q3		YEL-VIO	J10-P9/10	50VDC	BRN-ORG	J8-P4	23-800 090-5001-NB
#4	HULK CLOCKWISE	Q4		YEL-VIO	J10-PP/10	50VDC	BRN-YEL	J8-P5	23-800 090-5001-ND
#5	HULK EJECT	Q5		YEL-VIO	J10-P9/10	50VDC	BRN-GRN	J8-P6	26-1200 090-5044-NB
#6	CENTER 4-BANK DROP RESET	Q6		YEL-VIO	J10-P9/10	50VDC	BRN-BLU	J8-P7	25-1240 090-5034-NB
#7	ORBIT CONTROL GATE (LEFT)	Q7		YEL-VIO	J10-P9/10	50VDC	BRN-VIO	J8-P8	32-1250 090-5060-01
#8	SHAKER MOTOR (OPTIONAL)	Q8		RED-WHT	J17-P7	16VAC	BRN-GRY	J8-P9	502-5027-00
High Current Coils Group 2			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#9	LEFT POP BUMPER	Q9	I/O Power Driver	YEL-VIO	J10-P9/10	50VDC	BLU-BRN	J8-P1	26-1200 090-5044-NB
#10	RIGHT POP BUMPER	Q10		YEL-VIO	J10-P9/10	50VDC	BLU-RED	J8-P2	26-1200 090-5044-NB
#11	BOTTOM POP BUMPER	Q11		YEL-VIO	J10-P9/10	50VDC	BLU-ORG	J8-P4	26-1200 090-5044-NB
#12	RAMP CONTROL GATE (LEFT)	Q12		YEL-VIO	J10-P9/10	50VDC	BLU-YEL	J8-P5	515-8598-00 -ND
#13	LEFT SLINGSHOT	Q13		YEL-VIO	J10-P9/10	50VDC	BLU-GRN	J8-P6	26-1200 090-5044-NB
#14	RIGHT SLINGSHOT	Q14		YEL-VIO	J10-P9/10	50VDC	BLU-BLU	J8-P7	26-1200 090-5044-NB
#15	LEFT FLIPPER (50V RED/YEL)	Q15		GRY-YEL-3A Fuse-RED-YEL	J10-P6/7	50VDC	ORG-GRY	J8-P8	22-1080 090-5032-ND
#16	RIGHT FLIPPER (50V RED/YEL)	Q16		GRY-YEL-3A Fuse-RED-YEL	J10-P6/7	50VDC	ORG-VIO	J8-P9	22-1080 090-5032-ND
Low Current Coils Group 1			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#17	HULK ARMS (Step-Up Dr. Bd.)	Q17	I/O Power Driver	BRN	J7-P1	20VDC	VIO-BRN	J7-P2	24-940 090-5036
#18	FLASH: LEFT SIDE	Q18		ORG	J6-P10	20VDC	VIO-RED	J7-P3	#89 BULB 165-5000-89
#19	FLASH: RIGHT SIDE	Q19		ORG	J6-P10	20VDC	VIO-ORG	J7-P4	#89 BULB 165-5000-89
#20	FLASH: SLINGSHOT (X2)	Q20		ORG	J6-P10	20VDC	VIO-WHT	J7-P6	#908 BULB 165-5004-00
#21	FLASH: HULK	Q21		ORG	J6-P10	20VDC	VIO-GRN	J7-P7	#908 BULB 165-5004-00
#22	LOKI LOCKUP (Step-Up Dr. Bd.)	Q22		BRN	J7-P1	20VDC	VIO-BLU	J7-P8	26-1200 090-5044-ND
#23	HULK MAGNET (Step-Up Dr. Bd.)	Q23		VIO-YEL	J10-P8	50VDC	VIO-BLK	J7-P9	22-850 090-5076-00
#24	OPTIONAL (e.g. COIN METER)	Q24		RED	J16-P4-8	5VDC	VIO-GRY	J7-P10	COIN METER
Low Current Coils Group 2			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#25	FLASH: POP BUMPER	Q25	I/O Power Driver	ORG	J6-P10	20VDC	BLK-BRN	J6-P1	#89 BULB 165-5000-89
#26	FLASH: TESSERACT	Q26		ORG	J6-P10	20VDC	BLK-RED	J6-P2	#908 BULB 165-5004-00
#27	FLASH: BACKPANEL (LEFT)	Q27		ORG	J6-P10	20VDC	BLK-ORG	J6-P3	#89 BULB 165-5000-89
#28	FLASH: BACKPANEL # 2	Q28		ORG	J6-P10	20VDC	BLK-YEL	J6-P4	#89 BULB 165-5000-89
#29	FLASH: BACKPANEL # 3	Q29		ORG	J6-P10	20VDC	BLK-GRN	J6-P5	#89 BULB 165-5000-89
#30	FLASH: BACKPANEL # 4	Q30		ORG	J6-P10	20VDC	BLK-BLU	J6-P6	#89 BULB 165-5000-89
#31	FLASH: BACKPANEL # 5	Q31		ORG	J6-P10	20VDC	BLK-VIO	J6-P7	#89 BULB 165-5000-89
#32	FLASH: BACKPANEL (RIGHT)	Q32		ORG	J6-P10	20VDC	BLK-GRY	J6-P8	#89 BULB 165-5000-89



COIL MENU: SINGLE COIL & CYCLING COIL





Go To Lamp Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "LAMP" Icon. Controlled lamps are configured in and 8 X 10 Matrix of Rows [Lamp Returns / Ground] and Columns [Lamp Drives / 18VDC] with up to 80 lamps possible. The **LAMP TEST MENU** consists of five (5) parts: **Single Lamp Test**, **Test All Lamps**, **Row Lamps Test**, **Column Lamps Test** and **Ordered Lamps Test*** to test *all* lamps.

Remember, use the **GREEN Button** to go [**BACK**], exit or escape, the **RED Buttons** to [**< / -**] GO BACK / LEFT / [**+ / >**] GO FORWARD / RIGHT, and the **BLACK Button** to [**SELECT**] next or as "OK / ENTER."

Upon entering Single Lamp Test, ... the #1 lamp is shown. ... Display will light up ... the dot ...

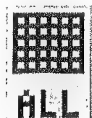


Single Lamp Test

To initiate, from the **LAMP MENU**, select the "ONE" Icon. As each lamp is selected, the lamp will light at it's location on the playfield as well as the Dot Matrix Display.

Upon entering **Single Lamp Test**, you will notice the #1 lamp is shown. The Dot Matrix Display will light up (highlight) the corresponding dot in the on-screen matrix, display the lamp name, lamp number and the Lamp Return / Drive wire colors. For the Lamp Matrix Grid, see the beginning section of this Service Game Manual.

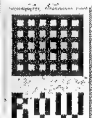
Upon entering All Lamps Test, ... the Dot Matrix Display is flashing "ALL LAMPS ON" ...



All Lamps Test

To initiate, from the **LAMP MENU**, select the "ALL" Icon. Upon entering **All Lamps Test**, you will notice the Dot Matrix Display is flashing **ALL LAMPS ON** and the lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix Grid. The Dot Matrix Display will light up (highlight) all of the dots in the on-screen matrix.

Upon entering Row Lamps Test, you will notice the #1 lamp row is shown.

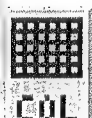


Row Lamps Test

To initiate, from the **LAMP MENU**, select the "ROW" Icon. As each lamp row is selected, the lamps in the row will light on the playfield as well as the Dot Matrix Display.

Upon entering **Row Lamps Test**, you will notice the #1 lamp row is shown. The Dot Matrix Display will light up (highlight) the corresponding row of dots in the on-screen matrix, display the lamp row number, the Lamp Return wire colors, the I/O PCB Connector and transistor number.

Upon entering Column Lamps Test, you will notice the #1 lamp column is shown.



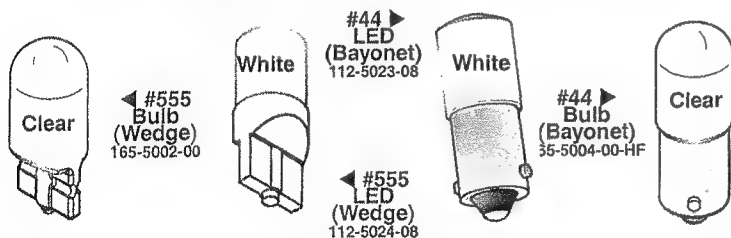
Column Lamps Test

To initiate, from the **LAMP MENU**, select the "COL" Icon. As each lamp column is selected, the lamps in the column will light on the playfield as well as the Dot Matrix Display.

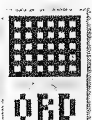
Upon entering **Column Lamps Test**, you will notice the #1 lamp column is shown. The Dot Matrix Display will light up (highlight) the corresponding row of dots in the on-screen matrix, display the lamp column number, the Lamp Drive (18VDC) wire colors, the I/O PCB Connector and IC number.



Bulb Types used for Control Lamps



* If not required in this game, Icon will not be shown.

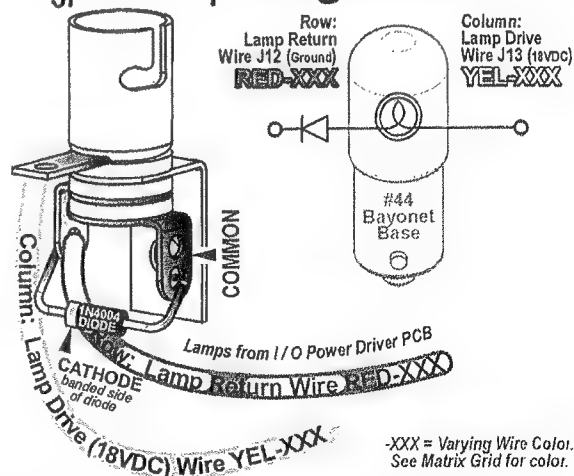


Ordered Lamps Test

To initiate, from the **LAMP MENU**, select the "ORD" Icon.

If required, this Icon will appear in the **LAMP MENU**. Identical to **Single Lamp Test**, however, the lamps lit are not in the Lamp Matrix numeric order, but ordered or arranged in separate localized grouping(s) for easier lamp checking.

Typical Lamp Wiring & Schematic



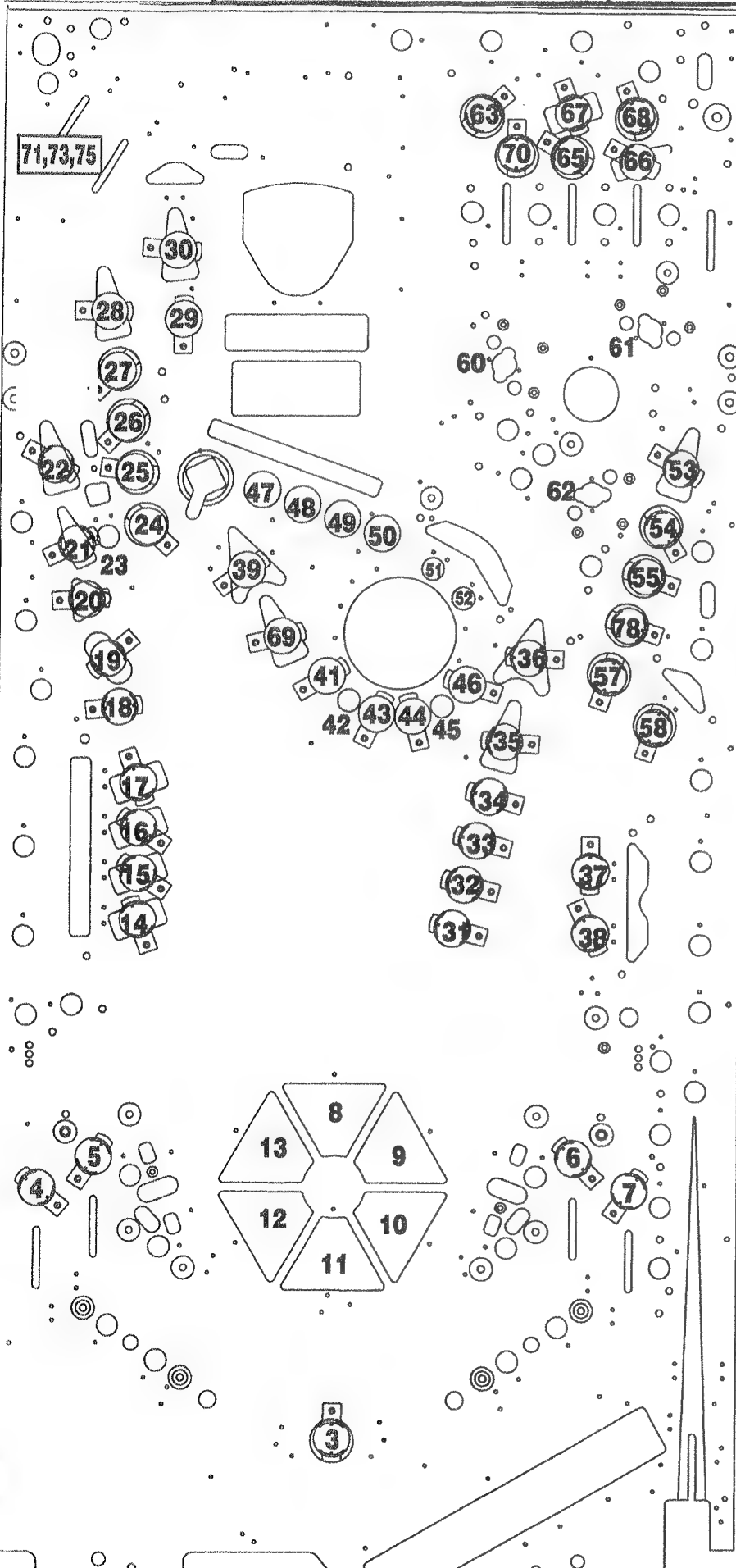
-XXX = Varying Wire Color. See Matrix Grid for color.

LAMP MATRIX GRID [#1 - #80] {Lamp Locations : next page}

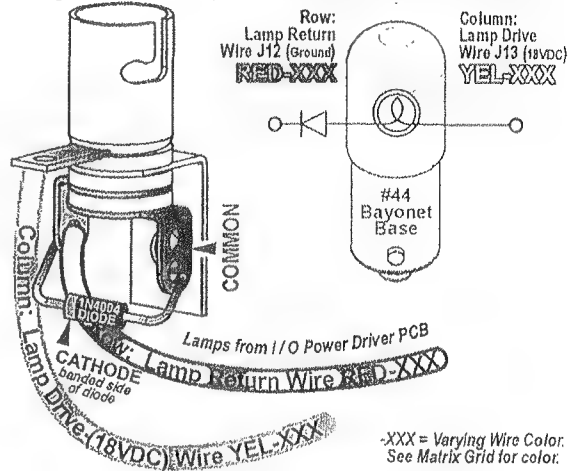
I / O	01	02	03	04	05	06	07	08	IC-U10
Power Driver Board	IC-U17	IC-U16	IC-U15	IC-U14	IC-U13	IC-U12	IC-U11	IC-U10	18VDC
Q33	YEL-BRN J12-P3	YEL-RED J13-P8	YEL-ORG J13-P7	YEL-BLK J13-P6	YEL-GRN J13-P5	YEL-BLU J13-P4	YEL-VIO J13-P3	YEL-GRY J13-P1	18VDC
GROUND RED-BRN J12-P1	# 555 LAMP L.P. #1 START BUTTON 165-5002-00	# 555 LAMP L.P. #2 TOURN BUTTON 165-5002-00	# 555 LAMP L.P. #3 SHOOT AGAIN 165-5002-00	# 555 LAMP L.P. #4 LEFT OUTLANE 165-5002-00	# 555 LAMP L.P. #5 LEFT RETURN LANE 165-5002-00	# 555 LAMP L.P. #6 RIGHT RETURN LANE 165-5002-00	# 555 LAMP L.P. #7 RIGHT OUTLANE 165-5002-00	# 555 LAMP L.P. #8 CAPTAIN AMERICA 165-5002-00	18VDC
GROUND RED-BLK J12-P2	# 55 LAMP L.P. #9 THOR	# 555 LAMP L.P. #10 HAWKEYE	# 555 LAMP L.P. #11 HULK	# 555 LAMP L.P. #12 BLACK WIDOW	# 555 LAMP L.P. #13 IRON MAN	# 555 LAMP L.P. #14 (T)HOR	# 555 LAMP L.P. #15 T(H)OR	# 555 LAMP L.P. #16 TH(O)R	18VDC
GROUND RED-YEL J12-P4	# 555 LAMP L.P. #17 THO(R)	# 555 LAMP L.P. #18 HAWKEYE #1 (BOT)	# 555 LAMP L.P. #19 HAWKEYE #2	# 555 LAMP L.P. #20 HAWKEYE #3	# 555 LAMP L.P. #21 HAWKEYE #4	# 555 LAMP L.P. #22 LEFT ORBIT (PURPLE)	# 555 LAMP L.P. #23 TESSERACT STANDUP	# 555 LAMP L.P. #24 CAPTAIN AMERICA #1 (BOT)	18VDC
GROUND RED-YEL J12-P5	# 555 LAMP L.P. #25 CAPTAIN AMERICA #2	# 555 LAMP L.P. #26 CAPTAIN AMERICA #3	# 555 LAMP L.P. #27 CAPTAIN AMERICA #4	# 555 LAMP L.P. #28 LEFT INNER LOOP (RED)	# 555 LAMP L.P. #29 SPECIAL	# 555 LAMP L.P. #30 HULK TARGET ARROW	# 555 LAMP L.P. #31 BLACK WIDOW #1 (BOT)	# 555 LAMP L.P. #32 BLACK WIDOW #2	18VDC
GROUND RED-GRN J12-P6	# 555 LAMP L.P. #33 BLACK WIDOW #3	# 555 LAMP L.P. #34 BLACK WIDOW #4	# 555 LAMP L.P. #35 LEFT RAMP (GRN)	# 555 LAMP L.P. #36 LEFT RAMP (GRN)	# 555 LAMP L.P. #37 RT. 2 BANK TARGET-TOP	# 555 LAMP L.P. #38 RT. 2 BANK TARGET-BOT	# 555 LAMP L.P. #39 HULK EJECT (GRN)	# 555 LAMP L.P. #40 HULK	18VDC
GROUND RED-GRN J12-P5	# 555 LAMP L.P. #41 (C)SMIC	# 44 LAMP L.P. #42 (C)SMIC	# 555 LAMP L.P. #43 CO(S)MIC	# 555 LAMP L.P. #44 COS(M)IC	# 44 LAMP L.P. #45 COSM(I)C	# 555 LAMP L.P. #46 COSMI(C)	# 555 LAMP L.P. #47 (H)ULK	# 555 LAMP L.P. #48 H(U)LK	18VDC
GROUND RED-VIO J12-P8	# 555 LAMP L.P. #49 HU(L)K	# 555 LAMP L.P. #50 HUL(K)	# 44 LAMP L.P. #51 TESSERACT STANDUP-L	# 44 LAMP L.P. #52 TESSERACT STANDUP-R	# 555 LAMP L.P. #53 RIGHT OTBIT (RED)	# 555 LAMP L.P. #54 IRON MAN #4	# 555 LAMP L.P. #55 IRON MAN #3	# 555 LAMP L.P. #56 IRON MAN	18VDC
GROUND RED-GRY J12-P9	# 555 LAMP L.P. #57 IRON MAN #1 (BOT)	# 555 LAMP L.P. #58 SHIELD AGENT	# 44 LAMP L.P. #59 L.P. #59	# 555 LAMP L.P. #60 LEFT POP BUMPER	# 555 LAMP L.P. #61 RIGHT POP BUMPER	# 555 LAMP L.P. #62 BOTTOM POP BUMPER	# 555 LAMP L.P. #63 TOP LANE (HULK)	# 555 LAMP L.P. #64 L.P. #64	18VDC
GROUND RED-WHT J12-P10	# 555 LAMP L.P. #65 TOP LANE (CAPTAIN AMERICA)	# 555 LAMP L.P. #66 TOP LANE (HAWKEYE)	# 555 LAMP L.P. #67 TOP LANE (THOR)	# 555 LAMP L.P. #68 TOP LANE (BLACK WIDOW)	# 555 LAMP L.P. #69 EXTRA BALL	# 555 LAMP L.P. #70 TOP LANE (IRON MAN)	# 44 LAMP L.P. #71 LOCK 1	# 555 LAMP L.P. #72 L.P. #72	18VDC
GROUND RED-WHT J12-P10	# 44 LAMP L.P. #73 LOCK 2	# 44 LAMP L.P. #74 L.P. #74	# 44 LAMP L.P. #75 LOCK 3	# 555 LAMP L.P. #76 L.P. #76	# 555 LAMP L.P. #77 L.P. #77	# 555 LAMP L.P. #78 IRON MAN #2	# 555 LAMP L.P. #79 L.P. #79	# 555 LAMP L.P. #80 L.P. #80	18VDC
RED J12-P11	165-5053-04-HF	165-5053-04-HF	165-5053-04-HF	165-5053-04-HF	165-5053-04-HF	165-5053-04-HF	165-5053-04-HF	165-5053-04-HF	165-5053-04-HF

Wire Color Abbreviations used:
 ▲ FOR MORE/ABOUT DIODE ON TERMINAL STRIPS & D.I.S., SEE SEC.5, CHP.2, PAGES 104-105

BLK Black
 BLU Blue
 BRN Brown
 GRN Green
 ORG Orange
 RED Red
 VIO Violet
 WHT White
 YEL Yellow

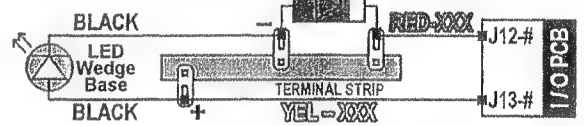


Typical Lamp Wiring & Schematic

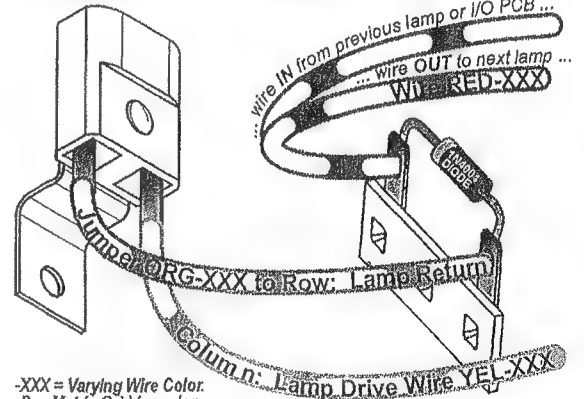
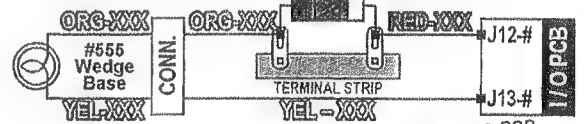


Typical Lamp Wiring & Schematic

... with Lamp Diode on a Terminal Strip (DOTS)
 Usually when an LED Module is used as a Controlled Lamp for a Pop Bumper.



... with Lamp Diode on a Terminal Strip (DOTS)
 Usually when a #555 Bulb is used as a Controlled Lamp for a Spot Light.



Game-Specific Tests

GAME

To initiate, from the **DIAGNOSTICS MENU**, select the "GAME" Icon. Ensure the Power Interlock Switch is pulled out when testing with the Coin Door open. This Menu is provided to allow the technician a simple method of testing game specific coils and/or switches, if required. If used, select the Icon (and Sub-Menu Icons, if any) and follow on-screen prompts.



Ball Trough Test

To initiate, from the **DIAGNOSTICS MENU**, select the "CLR" Icon. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. This Menu is provided to allow the technician a simple method of removing the balls from the trough and also, to test functionality of the trough, ensuring proper trough operation. Upon entering **Ball Trough Test**, you will notice that four switches are already indicated as closed. In the example, the 4-Ball Trough Switches #18, #19, #20 & #21 are shown closed (pinballs at rest in the ball trough). To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**.



Press the **Black [SELECT] Button** to eject the ball in the first position Switch #21 (VUK OPTO Trough #1 (R)). Simultaneously, the Dot Matrix Display and the playfield will eject the ball to the Trough Up-Kicker, eject from the Trough Up-Kicker into the Shooter Lane, momentarily closing Switch #23 (Shooter Lane), and is ejected onto the playfield where the technician can easily

retrieve the pinball or allow the ball(s) to re-enter the trough to continue **Ball Trough Test**. The Dot Matrix Display indicates Switch #18 (4-Ball Trough #4 (L)) as open as the remaining three (3) pinballs shift over one (1) position to the right. If the technician allows the ejected pinball to reenter the ball trough, the Dot Matrix Display will indicate Switch #18 as closed. **REMINDER:** Switch #22 is the stacking OPTO switch; If more than five (5) pinballs are used, the additional switches will be noted. Typically, four (4) pinballs are used and required for proper operation; if this amounts differs, it will be noted on the front page of this Service Game Manual.



CAUTION! Continuous use off the above test may overheat the Trough Up-Kicker Coil.



Technician Alerts

To initiate, from the **DIAGNOSTICS MENU**, select the "TECH" Icon. This Menu is provided to show any switch or solenoid problems and/or missing pinballs. If upon entering the **SERVICE MENU** the display indicated an asterisk (*) and "USE +/- TO VIEW TECH. ALERTS", alerts are present.



After pressing either Red [< / -] / [+ / >] Button or selecting this Icon in the **DIAGNOSTICS MENU**, the display will indicate the alert(s). If there are 2 alerts present, the display will indicate (1/2) with the 1st alert on the display. Press the Red [+ / >] Button to view the second alert (2/2). The second number in the parenthesis () after the slash (/) indicates how many alerts are

present. Refer to the start of this chapter regarding "Upon entering the **SERVICE MENU ***" indication and to **SWITCH ALERTS**. To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**. **Note:** While in this menu, an option may be present to jump (short-cut) to the appropriate Testing Menu (e.g. Coil Test, Switch Test, Game Specific Test or Ticket Dispenser Test, if installed).

NOTE ON SWITCH DETECTION : During game play, activation of switches are continuously monitored. For a switch to be determined as inoperable or **OUT OF SERVICE**, up to twenty games or so must be played for a switch to be automatically marked as **OUT OF SERVICE**. In programming, if a switch is determined to be faulty, game play is compensated. Switches noted as **OUT OF SERVICE** are determined to be stuck closed or open depending on switch usage. Free up the switch actuator, adjust or replace, if necessary. Performing a valid switch closure will put the switch back "IN SERVICE."

Determination of switch usage can be checked in **Audits** (review the Audits Section). Find the associated Audit with the switch in question and check usage; compare the numbers to commonly used switches. After any switch is checked and repaired or replaced, it's suggested to test the switch in the **Switch Test or Single Coil Test** (reviewed earlier in this section) where the associated coil to the switch can be tested as well. After correcting the problem, the switch will marked "IN SERVICE" and the switch is again monitored as specified above. *Only you can determine if a switch marked OUT OF SERVICE is actually inoperable, or if it is just not getting actuated during game play.*

NOTE ON PINBALL DETECTION : While in **TECHNICIAN ALERTS MENU**, if the following is displayed, the game has detected one (1) or more pinball(s) missing and has compensated for the lost pinball(s) to provide normal game play.

Technician Alerts continued on the next page.



Technician Alerts continued from previous page.

During game play, a pinball can get trapped or stuck. If after approximately 15 seconds of inactivity or "no scoring," **Ball Search** is started. **Note:** If the pinball is in the *Plunger Lane* or "held" on the flipper, no **Ball Search** will be performed. The game will perform one **Ball Search** in an attempt to "find" or free-up the pinball.

If the game does not see a switch closure (indicating the pinball has not been found), the Dot Matrix Display may indicate [**LOCATING PINBALLS PLEASE WAIT ...**], during which **Ball Search** will continue until the timer runs out (this feature will not happen if the game is in *Competition Mode*; **Ball Search** will continue until the pinball is found, unstuck and/or replaced manually). The display will momentarily acknowledge the missing pinball(s). The game will provide another pinball into play and will compensate for the lost pinball. Game play will appear normal.

Note: This detection and compensation will happen with every pinball, if each suffers the same fate of a ball trap. If **all** balls get trapped, the game cannot be played or started until the situation is rectified.

Important: Determine where the pinball is! **Do not add pinball(s)** until it is determined the pinball(s) are indeed missing and not just stuck. The most common places for a pinball to be stuck is in device holes (ejects and VUKs) or ball troughs. Determine that all devices are functionally properly. Check around plastic pieces and ramps to see if the pinball got jammed or stuck.

When the found pinball or a replacement pinball is added to the Ball Trough, the **Technician Alert** will immediately clear and will then indicate any remaining alerts (if present) or **NO TECHNICIAN ALERTS**.

Enter the **BALL TROUGH TEST** (review the previous page) to cycle the pinballs and to check proper switch and coil operation. If a pinball was added, and the originally stuck pinball has freed itself at a later time, the game will not operate correctly.



NOTE ON DEVICE MALFUNCTION : While in **TECHNICIAN ALERTS MENU**, if the following is displayed, the game has detected a "device malfunction." Check the device indicated (coil and/or switch).

Knocker Test

To initiate, from the **DIAGNOSTICS MENU**, select the "KNO- CKER" *Icon*. The digitally mastered "Knocker" is sounded. The *knocker sound* is used to alert the player if he/she has received a special, replay or a credit from the Match Award feature. Press the **Black [SELECT] Button** to activate the knocker. To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**.

FACTOID: The knocker got it's name from the 'original knocker' (20th century pinball games), which used a coil and when energized (fired), the plunger would strike a wood panel inside the cabinet.



Sound / Speaker Test

To initiate, from the **DIAGNOSTICS MENU**, select the "SPKR" *Icon*. This system produces true digital stereo sound from Backbox & Cabinet Speakers or "Mono" on the Cabinet Speaker (when used by itself). This Menu is provided to allow the technician a simple method of testing the speakers if rewired or replaced.

Upon entering **Sound / Speaker Test**, you will notice the Dot Matrix Display indicating the first option of available music and/or sound(s) in this test. Press the **Red [+ / >] Button** to cycle through the available music and/or sounds, and press the **Black [SELECT] Button** to play the option shown in the Dot Matrix Display. Press the **Green [BACK] Button** to exit.



Speaker Phase Testing

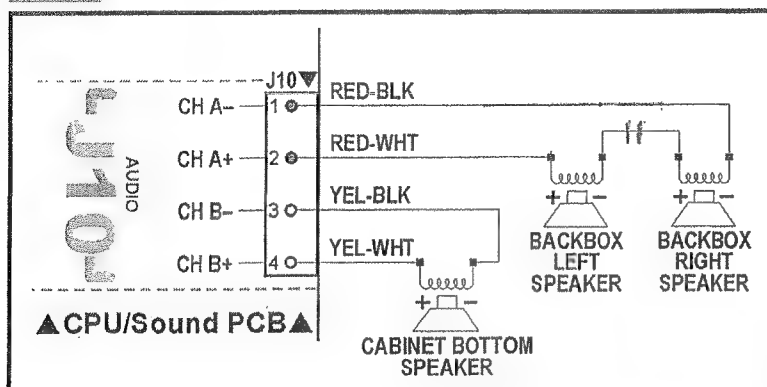
Connections to each of speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other one, bass frequencies will not be produced properly and the overall sound quality will be poor. To test for proper speaker phasing, use the **Sound / Speaker Test** to cycle through the available music and sound.

Speaker Phase Testing cont. next page.



Speaker Phase Testing continued from previous page.

If the sound is not balanced or doesn't sound correct, check the speaker wiring.



1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the Backbox Speaker's **RED-BLK** Wires and the Cabinet Speaker **YEL-BLK** Wire(s) are connected to the negative (-) terminal.

2. Disconnect the speaker output **Connector J10 (AUDIO)** from the CPU / Sound PCB (in the Backbox) and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers.

3. Make sure the positive (+) battery terminal is connected to the positive lead [J10, Pin-2, CH A+] (**RED-WHT**) or [J10, Pin-4, CH B+]

(**YEL-WHT**) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.



Begin Burn-In

To initiate, from the **DIAGNOSTICS MENU**, select the "BURN" Icon. After selecting this Icon, press the **Black [SELECT] Button** to begin (initiate) the **Burn-In Test**. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open (required for coil function). Upon entering **Burn-In Test**, the game will exercise all CPU I/O Functions: **Dot Matrix Display Test**, **Coil Cycling Testing**, **All Lamps Test** and **Sound / Speaker Test**. Press the **Green [BACK] Button**, to pause and to view the cumulative Burn-In minutes. Press the **Green [BACK] Button** again to return to the **DIAGNOSTICS MENU**.

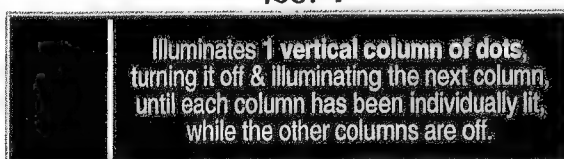
Note: To reset Burn-In minutes back to 0:00, see Section 3, Chapter 5, **GO TO RESET MENU** (via the **UTILITIES MENU**), **Reset Factory Settings**. **CAUTION:** Performing a **FACTORY RESET** will reset all other information as well (read the Utilities Section (**GO TO RESET MENU**), for more information).



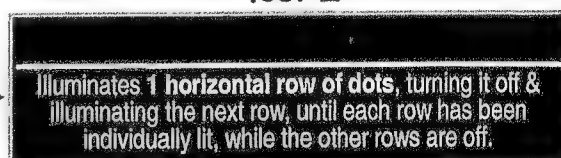
Dot Matrix Test

To initiate, from the **DIAGNOSTICS MENU**, select the "DOT TEST" Icon. After selecting this Icon the **Dot Matrix Test** immediately begins. The Dot Matrix Display will immediately and continuously illuminate and cycle each of the 5 Tests for 1 pass each. To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**.

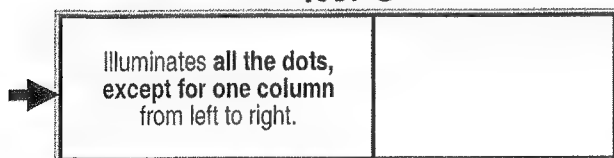
Test 1



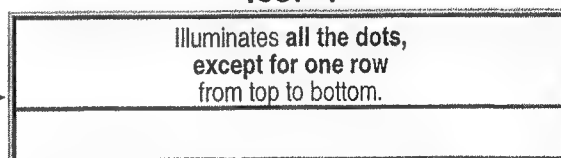
Test 2



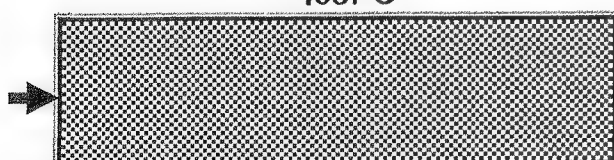
Test 3



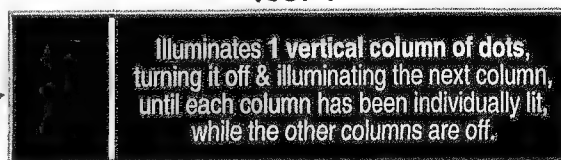
Test 4



Test 5



Test 1





Ticket Dispenser Test

To initiate, from the **DIAGNOSTICS MENU**, select the "TIX" *Icon*. This Menu (*Icon*) will only appear if Standard Adjustment 56, **Ticket Dispenser**, is set to **YES** (Default = **NO***). ***Note:** Some games shipped from the factory with a unique Dip Switch Setting will default to **YES**. To view and/or change your setting, see Adjustments Section (**GO TO ADJUSTMENTS MENU**). Please remember, if you install an optional Ticket Dispenser, and your default setting is "NO," you will have to reset it back to "YES" if a **Factory Reset** is performed.

After selecting this *Icon*, the **Ticket Dispenser Test** will start. With the Ticket Dispenser properly installed, manually feed your tickets into the dispenser. The dispenser will activate and pull in the first ticket. Press the **Black [SELECT] Button** (which energizes Coil #35, Aux 3: Switched Ground) to advance a ticket. Feeding your Tickets into the dispenser works because Coil #33, Aux 1: Ticket Advance (Enable) is always 'energized'. With a Ticket Meter installed, as one Ticket Passes through the Ticket Dispenser, one 'click' is fired to the Meter (Coil #34, Aux 2: Ticket Meter) for each ticket passing through. Dedicated Switch **D-19, Ticket Notch**, will also be indicated on-screen (*in combination with a audible sound*) as "closing" as the notch between the tickets passes through. In this test you can clear ticket jams and check and/or clear tickets in Escrow, if necessary. To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**.



CHOOSE EARNINGS or STANDARD AUDITS

GO TO AUDITS MENU: EARNINGS AUDITS [#1 – #13] / STANDARD AUDITS [#1 – #59]

Perform the below steps to review the audits. Enter the **SERVICE MENU**, then enter the **EARNINGS AUDITS** or **STANDARD AUDITS** MENUS. For audit definitions or summary, review the Audits Section (**GO TO AUDITS MENU**). Try the **"DUMP AUDITS TO USB"** Feature to create a text file of your audits. Don't forget to set the **DATE & TIME** in the **UTILITIES MENU**. See the Utilities Section (**GO TO UTILITIES MENU**).

Step 1 Press [**SELECT**].
Press [**BACK**] to exit for escape at any time.

Step 2 Press [**>**]. Go to the "AUD" Icon.
Press [**SELECT**].

Step 3 Press [**>**]. Go to the "EARN" or "S.P.I." Icon.
Press [**SELECT**].

Step 4 Press [**<**] [**>**] to move between audits.

Audit Number
Audit Name
Audit Result

EARNINGS AUDIT #1
TOTAL PAID CREDITS
0

EARNINGS AUDITS [#1 – #13] ▼

Nr.	EARNINGS AUDIT NAME	YOUR RESULT
1	TOTAL PAID CREDITS	
2	FREE GAME PERCENTAGE	
3	AVERAGE BALL TIME	
4	AVERAGE GAME TIME	
5	COINS THROUGH LEFT SLOT	
6	COINS THROUGH RIGHT SLOT	
7	COINS THROUGH CENTER SLOT	

Nr.	EARNINGS AUDIT NAME	YOUR RESULT
8	COINS THROUGH FOURTH SLOT	
9	COINS THROUGH FIFTH SLOT	
10	TOTAL COINS	
11	TOTAL EARNINGS	
12	METER CLICKS	
13	SOFTWARE METER	

STANDARD AUDITS [#1 – #59] ▼

Nr.	STANDARD AUDIT NAME	YOUR RESULT
1	TOTAL BALLS PLAYED	
2	TOTAL EXTRA BALLS	
3	EXTRA BALL PERCENTAGE	
4	REPLAY 1 AWARDS	
5	REPLAY 2 AWARDS	
6	REPLAY 3 AWARDS	
7	REPLAY 4 AWARDS	
8	TOTAL REPLAYS	
9	REPLAY PERCENTAGE	
10	TOTAL SPECIALS	
11	SPECIAL PERCENTAGE	
12	TOTAL MATCHES	
13	HIGH SCORE AWARDS	
14	HIGH SCORE PERCENT	
15	TOTAL FREE PLAYS	
16	TOTAL PLAYS	
17	0.0M – 1.99M SCORES	
18	2.0M – 3.99M SCORES	
19	4.0M – 5.99M SCORES	
20	6.0M – 7.99M SCORES	

Nr.	STANDARD AUDIT NAME	YOUR RESULT
21	8.0M – 9.99M SCORES	
22	10.0M – 12.49M SCORES	
23	12.5M – 14.99M SCORES	
24	15.0M – 17.49M SCORES	
25	17.5M – 19.99M SCORES	
26	20.0M – 24.99M SCORES	
27	25.0M – 29.99M SCORES	
28	30.0M – 39.99M SCORES	
29	40.0M – 49.99M SCORES	
30	50.0M – 74.99M SCORES	
31	75.0M – 99.99M SCORES	
32	100.0M – 149.99M SCORES	
33	150.0M+ SCORES	
34	AVERAGE SCORES	
35	SERVICE CREDITS	
36	BALL SEARCH STARTED	
37	LOST BALL FEEDS	
38	LOST BALL GAME STARTS	
39	LEFT DRAINS	
40	CENTER DRAINS	

Nr.	STANDARD AUDIT NAME	YOUR RESULT
41	RIGHT DRAINS	
42	TILTS	
43	TOTAL BALLS SAVED	
44	LEFT FLIPPER USED	
45	RIGHT FLIPPER USED	
46	0 – 1 MINUTE GAMES	
47	1 – 1.5 MINUTE GAMES	
48	1.5 – 2 MINUTE GAMES	
49	2 – 2.5 MINUTE GAMES	
50	2.5 – 3 MINUTE GAMES	
51	3 – 3.5 MINUTE GAMES	
52	3.5 – 4 MINUTE GAMES	
53	4 – 5 MINUTE GAMES	
54	5 – 6 MINUTE GAMES	
55	6 – 8 MINUTE GAMES	
56	8 – 10 MINUTE GAMES	
57	10 – 15 MINUTE GAMES	
58	15+ MINUTE GAMES	
59	RECENT REPLAY PERCENT	

Note: Audits are subject to change (with or without notice).

STANDARD ADJUSTMENTS [#1 – #63] ▼

Nr.	STANDARD ADJUSTMENT NAME	USA DEFAULT	YOUR SETTING	Nr.	STANDARD ADJUSTMENT NAME	USA DEFAULT	YOUR SETTING
1	REPLAY TYPE	AUTO		32	HIGH SCORE #1	___,000,000	
2	‡ REPLAY PERCENTAGE	10%		33	HIGH SCORE #2	___,000,000	
3	‡ REPLAY AWARD	CREDIT		34	HIGH SCORE #3	___,000,000	
4	‡ REPLAY LEVELS	1		35	HIGH SCORE #4	___,000,000	
5	‡ AUTO REPLAY START	___,000,000		36	HSTD INITIALS	3 INITIALS	
6	‡ DYNAMIC REPLAY START	___,000,000		37	HSTD RESET COUNT	2000	
7	‡ REPLAY LEVEL #1	___,000,000		38	FREE PLAY	NO	
8	‡ REPLAY LEVEL #2	___,000,000		39	LANGUAGE	ENGLISH	
9	‡ REPLAY LEVEL #3	___,000,000		40	PLAYER LANGUAGE SELECT	YES	
10	‡ REPLAY LEVEL #4	___,000,000		41	CUSTOM MESSAGE	ON	
11	‡ REPLAY BOOST	YES		42	FLASH LAMP POWER	NORMAL	
12	SPECIAL LIMIT	1		43	COIL PULSE POWER	NORMAL	
13	‡ SPECIAL PERCENTAGE	10%		44	KNOCKER VOLUME	NORMAL	
14	SPECIAL AWARD	CREDIT		45	GAME RESTART	YES	
15	FREE GAME LIMIT	5		46	BILL VALIDATOR	NO	
16	EXTRA BALL LIMIT	5		47	MUSIC VOLUME	1	
17	‡ EXTRA BALL PERCENTAGE	25%		48	BALL SAVE TIME	0:05	
18	GAME PRICING	USA 10		49	TIMED PLUNGER	OFF	
19	MATCH PERCENTAGE	9%		50	FLIPPER BALL LAUNCH	OFF	
20	MATCH AWARD	CREDIT		51	COINDOOR BALL SAVER	NO	
21	BALLS PER GAME	3		52	COMPETITION MODE	NO	
22	TILT WARNINGS	2		53	CONSOLATION BALL	YES	
23	CREDIT LIMIT	30		54	FAST BOOT	YES	
24	ALLOW HIGH SCORES	YES		55	Q24 OPTION	COIN METER	
25	HIGH SCORE AWARD	CREDIT		56	TICKET DISPENSER	NO	
26	GRAND CHAMPION AWARDS	1		57	PLAYER COMPETITION	YES	
27	HIGH SCORE #1 AWARDS	1		58	TEAM SCORES	NO	
28	HIGH SCORE #2 AWARDS	0		59	LOCATION ID	0	
29	HIGH SCORE #3 AWARDS	0		60	GAME ID	0	
30	HIGH SCORE #4 AWARDS	0		61	TIME FORMAT	12-HOUR	
31	GRAND CHAMPION SCORE	___,000,000		62	COIN INPUT DELAY	30	
				63	LOST BALL RECOVERY	YES	

Factory Defaults Settings are subject to change during production (especially Standard Adjustments 2, 4, 5, 13, 16-17, 19, 31-35 & 47).

‡ Not all Standard Adjustments are shown. Depending on the setting (whether Factory Default or if changed by the operator), associated adjustments do not appear, if not required. **Note:** If Game Dip Switch other than USA is installed, different Defaults will appear.

Feature Adjustments [#1 – #+]

GAME To initiate, from the **ADJUSTMENTS MENU**, select the "GAME" Icon. The Dot Matrix Display will indicate the adjustment number (in this group), adjust. name, adjust. setting and comment line. The current adjustment will remain on the display until the next adjustment is viewed or when this sub-menu is exited.

>>> **FACTORY RESET or CODE UPDATE NOTE:** Don't forget, any changes you make to your adjustments will revert back to the Factory Default settings if you perform a Factory Reset or update your Game Code. See Utilities Section (**GO TO RESETS MENU** and **GO TO USB MENU**).

View the Coils Detailed Chart Menu to see if this game is Shaker Motor Enabled. If it is, set the options in the Feature Adjustment as seen below. (typically the last one).

SHAKER MOTOR (OPTIONAL) : Set to **NONE, MINIMAL USE, MODERATE USE** or **MAXIMAL USE**.

Factory Default = **MODERATE USE**. Set to any of the varying "... **USES**" if an Optional Shaker Motor Kit (SPI Part Number **502-5027-00**) was installed correctly in this pinball machine. See the assembly (kit) on the last page of Blue Pages (Major Assemblies). Also see Shaker Motor Coil (Q8) in the Coils Detailed Chart Table at the beginning of this Service Game Manual or the beginning of the Yellow Pages.

USA & International (non-Euro) Standard Pricing Select Table

CPU/SOUND PCB DIP SWITCH SW1 SETTING			COUNTRY SETTING OPTION(S)	COIN MECHANISMS (SWITCHES) COINS THRU ... SLOT:				PRICING SCHEME Number of Plays (Credits) for Price Amount Shown See "Appendix J" for Coin Cards Examples & Info			Requires SPI Coin Card(s) Part Number									
Pos.	1	2	3	4	5	6	7	8	Default Highlighted	LEFT	CENTER	RIGHT	4TH	USD // UNITED STATES DOLLAR // [\$]						
ON									USA 1	0.25	1.00	0.25		1/0.25			755-5400-01-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	USA 2					1/0.50	2/0.75	3/1.00	755-5400-09-Y			
HIGHLIGHTED									USA 3					1/0.50	For USA 6 and USA 7 use: 755-5400-02-Y USA 6 Note: If player uses X4 25c quarters = 2 plays. However, \$1 bill = 3 plays.			755-5400-02-Y		
= Factory Default									USA 4					1/0.50			755-5400-02-Y			
HIGHLIGHTED									USA 5					1/0.50 2/1.00	3/1.50	5/2.00	755-5400-08-Y			
= Not Shown on Coin Card									USA 6					1/0.50	2 1/4 X 25c	3 1/5 1.00 Bill	Used to promote the Bill Validator.			
									USA 7					1/0.50 2/1.00	4/1.50	6/2.00				
									USA 8					1/0.50	3/1.00		755-5400-00-Y			
									USA 9					1/1.00			755-5400-07-Y			
									USA 10					1/0.75	2/1.50	3/2.00	755-5400-11-Y			
									USA 11											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					AUD // AUSTRALIAN DOLLARS // [\$ AUS]						
ON	▲	▲	▲						AUSTRALIA 1	0.20	1.00	2.00		1/1.00	3/2.00		755-5406-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	AUSTRALIA 2					1/1.00			(1 Side)			
									AUSTRALIA 3					1/2.00						
									AUSTRALIA 4					1/2.00	2/4.00	3/5.00				
									AUSTRALIA 5					1/3.00	2/5.00	3/8.00	5/10.00			
									AUSTRALIA 6					1/2.00	2/3.00					
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					CAD // CANADIAN DOLLARS // [\$ CAN]						
ON	▲	▲							CANADA 1 [25c door]	0.25	0.25	1.00	2.00	1/0.50	2/0.75	3/1.00	755-5400-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	CANADA 2 [dollar door]	1.00		2.00		1/1.00	3/2.00		755-5400-10-Y			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					HRK // CROATIAN KUNA // [kuna]						
ON	▲	▲	▲						CROATIA	1	2	5		1/3	2/5		755-5410-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼									(2-Sided)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					DKK // DANISH KRONER // [Kr]						
ON	▲	▲	▲						DENMARK 1	1	5	10	20	1/3	2/5		755-5402-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	DENMARK 2					1/2	2/4	3/5	4/7	5/9	7/10	(2-Sided)
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					JPY // JAPANESE YEN // [¥]						
ON	▲	▲	▲						JAPAN 1	100		100		1/100			755-5408-01-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	JAPAN 2					1/100	3/200		(2-Sided)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					LTL // LITHUANIA LITAI // [Lt]						
ON	▲	▲	▲						LITHUANIA	1	2	5		1/2			755-5416-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼									(1 Side)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					TOKEN // Middle East currency used to buy token // [TOKEN]						
ON	▲	▲	▲						MIDDLE EAST	token		token		1/1			755-5416-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼									(use Side 1)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					NZD // NEW ZEALAND DOLLAR // [\$ NZD]						
ON				▲					NEW ZEALAND 1	1		2		1/1			755-5406-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	NEW ZEALAND 2					1/1	3/2		(Side 2)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					NOK // NORWEGIAN KRONE // [Kr]						
ON	▲	▲	▲						NORWAY 1	10	5	20		1/10			755-5403-01-Y or			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	NORWAY 2					1/10	3/20		-02-Y / (2-Sided)			
									NORWAY 3					1/20			755-5403-03-Y			
									NORWAY 4					1/20	3/40		(2-Sided)			
									NORWAY 5					1/10						
									NORWAY 6					1/10	3/20					
									NORWAY 7					1/20						
									NORWAY					1/20	3/40					
Pos.	1	2	3	4	5	6	7	8	Default Highlighted	▼ LEFT SWITCH CAN BE WIRED TO BILL ACCEPTOR ▼				RUB // RUSSIAN RUBLE // [Ruble]						
ON	▲			▲	▲				RUSSIA	10	5	1		1/5			755-5411-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼									(2-Sided)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					ZAR // SOUTH AFRICAN RAND // [R]						
ON			▲	▲					SO. AFRICA 1	0.50	1.00	2.00	5.00	1/2.00			755-5409-01-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	SO. AFRICA 2					1/3.00	2/5.00		(2-Sided)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					SEK // SWEDISH KRONOR // [Kr]						
ON	▲	▲							SWEDEN 1	1	5	10		1/10	2/15	3/20	755-5404-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	SWEDEN 2					1/5			(2-Sided)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					CHF // SWISS FRANCES // [S f]						
ON			▲	▲					SWITZERLAND 1	1	2	5		1/1	2/2	3/3	4/4	6/5	755-5405-00-Y	
OFF	▼	▼	▼	▼	▼	▼	▼	▼	SWITZERLAND 2					1/1	3/2	5/3	7/4	9/5	(2-Sided)	
Pos.	1	2	3	4	5	6	7	8	Default Highlighted					TWD // TAIWANESE DOLLAR // [TWD]						
ON				▲	▲				TAIWAN	10		10		1/10			755-5412-00-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼									(use Side 1)			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted	▼ 5TH COIN SLOT NOT AVAILABLE WITH CUSTOM PRICING ▼				GPB // UNITED KINGDOM POUNDS // [£]						
ON	▲	▲	▲						UK 1	LEFT	CENTER	RIGHT	4TH	5TH	3/1.00	7/2.00		755-5407-00-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼	UK 2						4/1.00			755-5407-01-Y*		
									UK 3						1/0.50 2/1.00	3/1.50	5/2.00	755-5407-01		
									UK 4						1/0.30 2/0.60	3/0.90	4/1.00	755-5407-01-Y*		
									UK 5	0.10	0.50	1.00	0.20	2£	1/1.00	3/2.00		755-5407-01		
									ATTENTION: UK 5TH COIN SLOT TIED TO 6TH CHANNEL ON ELEC.											

ATTENTION: UK 5TH
COIN SLOT TIED TO 6TH
CHANNEL ON ELEC.



Game Pricing

Euro 1-12 Summary & International (Euro) Standard Pricing Select Table

CPU/SOUND PCB DIP SWITCH SW1 SETTING									COUNTRY SETTING OPTION(S)	COIN MECHANISMS (SWITCHES) COINS THRU ... SLOT: LEFT CENTER RIGHT 4TH				PRICING SCHEME Number of Plays (Credits) for Price Amount Shown See "Appendix J" for Coin Cards Examples & Info!				Requires SPI Coin Card(s) Part Number
Pos.	1	2	3	4	5	6	7	8	Default Highlighted	<div>0.50 1.00 2.00</div> <div>optional 0.20 optional</div>				EUR // EUROPEAN UNION EUROS // €				
ON	S	E	E	B	E	L	O	W	Euro 1					1/0.50	2/1.00	3/1.50	5/2.00	755-5401-01-Y
OFF	S	E	T	T	I	N	G	S	Euro 2					1/0.50	3/1.00			755-5401-02-Y
Euro 1-12 are alternate settings for countries using the Euro.									Euro 3					1/0.50	2/1.00	3/1.50	6/2.00	755-5401-03-Y
HIGHLIGHTED = Factory Default									Euro 4					1/0.50	3/1.00	4/1.50	7/2.00	755-5401-04-Y
HIGHLIGHTED = Not Shown on Coin Card									Euro 5					2/0.50				755-5401-05-Y
									Euro 6					1/1.00	2/2.00	3/3.00	5/4.00	755-5401-06-Y
									Euro 7					1/1.00	3/2.00			755-5401-07-Y
									Euro 8					1/1.00	2/1.50	3/2.00		755-5401-08-Y
									Euro 9					1/1.00	3/2.00	7/3.00		755-5401-09-Y
									Euro 10					1/1.00	4/2.00			755-5401-10-Y
									Euro 11					2/1.00	4/2.00	6/3.00	9/4.00	755-5401-11-Y
									Euro 12					755-5401-12-Y				

For a different Euro Pricing Scheme (other than Factory Default listed below), scroll through Standard Adjustment 18: Euro 1-12 or CUSTOM* for new setting (reference above Euro 1-12 Summary). Keep the Country Dip Switch Setting the same as listed below.

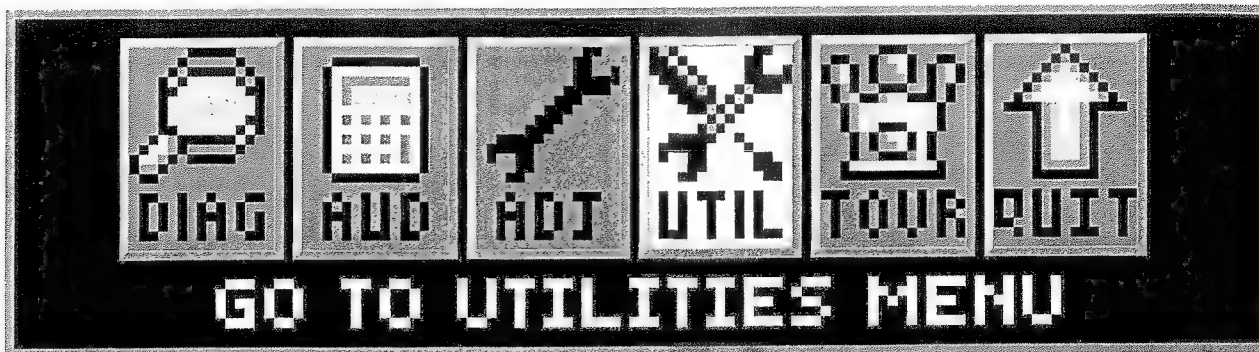
Pos.	1	2	3	4	5	6	7	8	Default Highlighted	EUR // EUROPEAN UNION EUROS // (1 €)									
ON	▲								AUSTRIA Euro 9	0.50	1.00	2.00		1/1.00	2/1.50	3/2.00	755-5401-09-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▲								BELGIUM Euro 1	0.50	1.00	2.00		1/0.50			755-5401-01-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▲	▲							FINLAND Euro 8	0.50	1.00	2.00		1/1.00	3/2.00		755-5401-08-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▲	▲							FRANCE Euro 10	0.50	1.00	2.00		1/1.00	3/2.00	7/3.00	755-5401-10-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▲	▲	▲						GERMANY 1	0.50	1.00	2.00		1/0.50			755-5401-01-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼	GERMANY 2					1/0.50 2/1.00	3/1.50	5/2.00		755-5401-02-Y	
									GERMANY 3					1/0.50 2/1.00	3/1.50	6/2.00		755-5401-04-Y	
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▲	▲	▲	▲					GREECE Euro 8	0.50	1.00	2.00		1/1.00	3/2.00		755-5401-08-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▼	▼	▼	▲					ITALY 1	0.50	0.50		1/0.50			755-5401-01-Y			
OFF	▼	▼	▼	▼	▼	▼	▼	▼	ITALY 2				1/1.00	3/2.00		755-5401-08-Y			
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▼	▼	▲						NETHERLANDS Euro 3	0.50	1.00	2.00		1/0.50	3/1.00		755-5401-03-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▲				▲				PORTUGAL Euro 1	0.50		0.50		1/0.50			755-5401-01-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											
Pos.	1	2	3	4	5	6	7	8	Default Highlighted										
ON	▼	▲			▲				SPAIN Euro 8	0.50	1.00	2.00		1/1.00	3/2.00		755-5401-08-Y		
OFF	▼	▼	▼	▼	▼	▼	▼	▼											

HIGHLIGHTED = Factory Default **HIGHLIGHTED** = Not Shown on Coin Card

For the associated Coinage Card required if the Factory Default Setting was changed, view on-line at:

<http://www.sternpinball.com/coinagecards.shtml>

You can download and print the replacement card. Adobe® Reader 5.0 or higher required (links on site). Use Yellow Card Stock: ASTROBRIGHTS® SOLAR YELLOW #65 FROM WAUSAU PAPER PRODUCTS (Stock #22731)



To initiate, from the **MAIN MENU**, select the "UTIL" *Icon*. The **UTILITIES MENU** provides ways to quickly and easily customize your game with **Installs** (pre-sets for game **Standard & Feature Adjustments**), set-up a **Custom Message** (short-cut to **Standard Adjustment 41, Custom Message**), set-up **Custom Pricing** (short-cut to **Standard Adjustment 18**, to the **Custom Pricing Sub-Menu**), set-up the **Date and Time** (required if the date and time is needed to be accurate for data dumps and for tournaments), reset certain particular game data or perform a complete **Factory Reset** and to download game data, update or backup game code in the **USB MENU**.

All **UTILITIES, INSTALLS, RESETS MENU** and **USB MENU Icons** and there usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some *Icons* may appear non-functional or may not appear at all. **Installs (Adjustments), Icons and/or functions, order and operation are subject to change. If in doubt use the Factory Default Settings (review Install Factory on the next page).**

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [**BACK**], exit or escape, the **RED Buttons** to [**< / -**] MOVE BACK / LEFT / [**+ / >**] MOVE FORWARD / RIGHT to view the next audit in the group, and the **BLACK Button** to [**SELECT**] the sub-menus.



Go To Installs Menu

To initiate, from the **UTILITIES MENU**, select the "INST" *Icon*. The **INSTALLS MENU** provides 13 **Installs** to vary **Game Play Difficulty** (set with **Feature Adjustments**) or **Game Play Type** and **Install Factory** (restores all adjustments to **Factory Defaults**).

For **detailed customization** or to check current **Adjustments Defaults** (either changed by **YOU** in the **Adjustments Menu** or by this **INSTALLS MENU** or for **Factory Default Settings**), see **Section 3, Chapter 4, GO TO ADJUSTMENTS MENU**. After completing one or more of the **Installs** in this chapter, go back to the **ADJUSTMENTS MENU** to see which **Standard and/or Feature Adjustments** have changed (**Feature Adjustments and/or settings are subject to change during production, and may differ than what is described in the tables at the end of this chapter**). The Dot Display will indicate if a setting is a **Factory Default** or not. If the settings are not to your liking, perform **one** of the following:

- 1.: **Manually change the Standard & Feature Adjustments Settings** (perform this task in the **ADJUSTMENTS MENU**, see the **Adjustments Section**).
- 2.: **Install Factory** (see the last install) on how to reset all of the **Standard & Feature Adjustments** back to the **Factory Default Settings**.

Multiple **Installs can be set** to vary game play; however, for **Installs** that have **one or more Adjustments** in common, the **last "Install"** selected & **activated**, will **supersede** any previously changed Adjustment(s) from any prior **Installs**. Any adjustments which you changed and are not affected by the **Install** will remain as set.

For example, if you want a **5-BALL Game** set to **EXTRA EASY**: Select and **activate** the "5BAL" *Icon first* (which will typically change any **Feature Difficulty Adjustments** to **HARD**), **then** select & **activate** the "X.EZ" *Icon* to **change back** the **Difficulty Adjustments** to **EXTRA EASY**. However, if the "X.EZ" *Icon* was selected & **activated** first, **then** the "5BAL" *Icon* was selected & **activated**, the game will be set to a **5-BALL Game** set to **HARD**.

Remember, use the **GREEN Button** to go [**BACK**], exit or escape and the **BLACK Button** to [**SELECT**] to **INSTALL** your new setting(s).



Install Extra Easy

To initiate, from the **INSTALLS MENU**, select the "X.EZ" *Icon*. The Dot Matrix Display will indicate the **INSTALL EXTRA EASY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.

Installs Menu continued on the next page.



Install Easy

To initiate, from the **INSTALLS MENU**, select the "EASY" *Icon*. The Dot Matrix Display will indicate the **INSTALL EASY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Medium (Normal or Factory Settings)

To initiate, from the **INSTALLS MENU**, select the "FACT" *Icon*. The Dot Matrix Display will indicate the **INSTALL MEDIUM**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Hard

To initiate, from the **INSTALLS MENU**, select the "HARD" *Icon*. The Dot Matrix Display will indicate the **INSTALL HARD**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Extra Hard

To initiate, from the **INSTALLS MENU**, select the "X.HD" *Icon*. The Dot Matrix Display will indicate the **INSTALL EXTRA HARD**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install 3-Ball or 5-Ball

To initiate, from the **INSTALLS MENU**, select either the "3BAL" or "5BAL" *Icons*. The Dot Matrix Display will indicate the **INSTALL 3-BALL** or **5-BALL** depending on choice. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to 3 Balls per game

(Factory Default is 3 Balls per game, not including extra balls earned by the player, if any).



Install Competition

To initiate, from the **INSTALLS MENU**, select the "COMP" *Icon*. The Dot Matrix Display will indicate the **INSTALL COMPETITION**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to "Tournament" Rules. *Programming varies and is subject to change.*



Install Director's Cut

To initiate, from the **INSTALLS MENU**, select the "DCUT" *Icon*. The Dot Matrix Display will indicate the **INSTALL DIRECTOR'S CUT**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to programmer's choice. *Programming varies and is subject to change.*



Install Home Play

To initiate, from the **INSTALLS MENU**, select the "HOME" *Icon*. The Dot Matrix Display will indicate the **INSTALL HOME PLAY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to "Home" Rules. *Programming varies and is subject to change.*



Install Novelty

To initiate, from the **INSTALLS MENU**, select the "NOV" *Icon*. The Dot Matrix Display will indicate the **INSTALL NOVELTY**. Follow the on-screen prompts to perform the **Install**.

***** This setting is recommended where local laws restrict certain game features. *****

Set the **Game Play Type** to "Restricted" Rules. *Programming varies and is subject to change.*



Install Add-A-Ball

To initiate, from the **INSTALLS MENU**, select the "A.A.B." *Icon*. The Dot Matrix Display will indicate the **INSTALL ADD-A-BALL**. Follow the on-screen prompts to perform the **Install**.

***** This setting is recommended where local laws restrict certain game features. *****

Set the **Game Play Type** to "Restricted" Rules. *Programming varies and is subject to change.*



Install Factory

To initiate, from the **INSTALLS MENU**, select the "FACT" *Icon*. The Dot Matrix Display will indicate the **INSTALL FACTORY**. Follow the on-screen prompts to perform the **Install**. **CAUTION!** All **Standard** and **Feature Adjustments** which were changed in the **INSTALLS MENU** or **ADJUSTMENTS MENU** are returned to the **Factory Defaults** (as indicated in the Dot Display in the **ADJUSTMENTS MENU**). *Note: To perform a complete Factory Reset, GO TO THE RESETS MENU. Escape back to the UTILITIES MENU, select the "RESET" Icon, then select the "FACT" Icon in the RESETS MENU (review the end of this section, Reset Factory Settings).*



Enter Custom Message

To initiate, from the **UTILITIES MENU**, select the "ABCD CUST MSG" *Icon*. The **SET CUSTOM MESSAGE** (a short-cut for Standard Adjustment 41, *Custom Message*) provides an opportunity to have a text message appear in the the **Attract Mode**. Follow the on-screen prompts to complete [END].

Remember, use the **GREEN Button** to go [BACK], exit or escape, the **RED Buttons** to [< / -] MOVE LEFT / CHOOSE NEXT [+ / >] MOVE RIGHT / CHOOSE PREVIOUS, and the **BLACK Button** to [SELECT] as 'OK'.



Set Custom Pricing

To initiate, from the **UTILITIES MENU**, select the "PRIC" *Icon*. The **CUSTOM PRICING MENU** (a short-cut for Standard Adjustment 18, *Game Pricing*, and setting selected is **CUSTOM**) provides an opportunity to set **Custom Pricing**.

Note ! MONETARY AMOUNT MUST BE SELECTED FIRST! Press [BACK] to - DECREASE or [SELECT] to + INCREASE the [< \$ >] monetary amount (e.g. look at the right side of the display from \$0.25 to \$0.50). Press [< / -] to - DECREASE or [+ / >] to + INCREASE the credit quantity (e.g. look at the left side of the display from 0 CREDITS AT: to 1 CREDIT AT:).

REMINDER
In these menus:

Press [BACK] to - DECREASE [< \$]

Press [SELECT] to + INCREASE [\$ >]

IF EXAMPLE CUSTOM PRICING SETTING DESIRED IS :

1 Play for \$0.50, 3 Plays for \$1.00 and 7 Plays for \$2.00

THEN YOU WILL NEED TO PERFORM THE FOLLOWING :

Step 1 The starting display appears as below if no prior **Custom Pricing** was installed.

```

CUSTOM PRICING
0 CREDITS AT:      $0.25
USE -/+ TO CHANGE CREDITS
  
```

Step 2 Press [SELECT] to + INCREASE to \$0.50.
Press [+ / >] to + INCREASE to 1 CREDIT AT:

```

CUSTOM PRICING
1 CREDIT AT:      $0.50
1/0.50
USE -/+ TO 'INSTALL'
  
```

Step 3 Press [SELECT] to + INCREASE to \$1.00.
Press [+ / >] to + INCREASE to 2 CREDITS AT:

```

CUSTOM PRICING
2 CREDITS AT:      $1.00
1/0.50 3/1.00
USE -/+ TO CHANGE CREDITS
  
```

Step 4 Press [SELECT] to + INCREASE to \$2.00.
Press [+ / >] to + INCREASE to 4 CREDITS AT:

```

CUSTOM PRICING
4 CREDITS AT:      $2.00
1/0.50 3/1.00 7/2.00
USE -/+ TO CHANGE CREDITS
  
```

Step 5 Press [SELECT] to + INCREASE the amount once (example = \$2.25).

```

CUSTOM PRICING
0 CREDITS AT:      $2.25
1/0.50 3/1.00 7/2.00
USE -/+ TO 'INSTALL'
  
```

Step 6 Press [SELECT] to INSTALL.
Press [< / -] [+ / >] or [BACK] to edit.

```

CUSTOM PRICING
INSTALL
1/0.50 3/1.00 7/2.00
PRESS 'SELECT' TO INSTALL
  
```

Press [< / -] once or press [+ / >] eleven times until **INSTALL** appears.

Step 7 Press [SELECT], press [BACK] twice to exit the **SERVICE MENU** with your **Custom Pricing** installed.

```

CUSTOM PRICING
INSTALLED
PRESS 'SELECT' TO CONTINUE
  
```

To correct or make new changes, reenter, which brings you to **Step 6**. Press [BACK] repeatedly until the monetary amount shown is the desired amount and then continue following the above steps with your new or corrected settings. If you are still having difficulty or if you have any questions, please call Technical Support 800-542-5377 or 708-345-7700, option 1.



Set Date / Time

To initiate, from the **UTILITIES MENU**, select the "TIME" *Icon*. The **SET TIME MENU** appears with the **MONTH** flashing. Setting the date and time is required for 'Data Dumps' and Tournament Start and End Dates. If the setting of Standard Adjustment 61, **Time Format**, is set to **12-HOUR** (*Factory Default*) the time will be expressed in the **AM / PM** format. If Standard Adjustment 61, **Time Format**, is set to **24-HOUR** the time will be expressed in the **24-hour** format.



Go To Resets Menu

To initiate, from the **UTILITIES MENU**, select the "RESET" *Icon*. The **RESETS MENU** provides six (6) functions to reset *only the Coin Audits*, reset *only the Game Audits*, reset *only the Grand Champion Score*, reset *only the High Score(s)*, reset *only the paid Credits* (includes *Service Credits*) or to reset **ALL DATA** back to the **Factory Default Settings**.



Reset Coin Audits

To initiate, from the **RESET MENU**, select the "COIN" *Icon*. ⚠ **ONLY the Coin Audits** [Earnings Audits 5–12], will be reset to zero (0), *Factory Default Settings*. Follow the on-screen prompts to perform the **Reset**.



Reset Game Audits

To initiate, from the **RESET MENU**, select the "AUD" *Icon*. ⚠ **ONLY the Game Audits** [Earnings Audits 1–4, Standard Audits 1–59 and Feature Audits 1–XX*], will be reset to zero (0), *Factory Default Settings*. Follow the on-screen prompts to perform the **Reset**. *varies per game title.



Reset Grand Champion (Score)

To initiate, from the **RESET MENU**, select the "GC" *Icon*. ⚠ **ONLY the Grand Champion Score** [adjustable via Standard Adjustment 31], will be reset to *Factory Default Setting*. Follow the on-screen prompts to perform the **Reset**.



Reset High Scores

To initiate, from the **RESET MENU**, select the "HSTD" *Icon*. ⚠ **ONLY the High Score(s)** [adjustable via Standard Adjustments 32–35], will be reset to *Factory Default Setting(s)*. Follow the on-screen prompts to perform the **Reset**. **Note:** *High Scores* (but not *Grand Champion Score*) are reset automatically every 2,000 games (*Factory Default Setting*) [adjustable via Standard Adjustment 37, **HSTD Reset Count**].



Reset Credits

To initiate, from the **RESET MENU**, select the "CRED" *Icon*. ⚠ **ONLY the Credits** (includes *Service Credits*) [adjustable via Standard Adjustment 23, **Credit Limit**], will be reset to zero (0), *Factory Default Settings*. Follow the on-screen prompts to perform the **Reset**.



Reset Factory Settings

To initiate, from the **RESET MENU**, select the "FACT" *Icon*. ⚠ **ALL GAME DATA IS RESET!** (with the exception of *Earnings Audit 13, Software Meter*). **NOTE: IF YOU HAD SET-UP CUSTOM PRICING OR HAD CHANGED ANY ADJUSTMENTS OR PERFORMED INSTALLS, IT IS SUGGESTED TO WRITE DOWN YOUR CHANGES PRIOR TO THE FACTORY RESET.** Follow the on-screen prompts to perform the **Reset**.



Go To USB Menu

To initiate, from the **UTILITIES MENU**, select the "USB" *Icon*. The **USB MENU** provides three (3) functions to download game data, update your game code or backup your code onto a USB Memory Stick. *Review the inside cover for information on how to update your game code.*



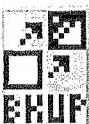
Update Game Code

To initiate, from the **USB MENU**, select the "UPDT" *Icon*. Follow the on-screen prompts or review the inside cover for more information.



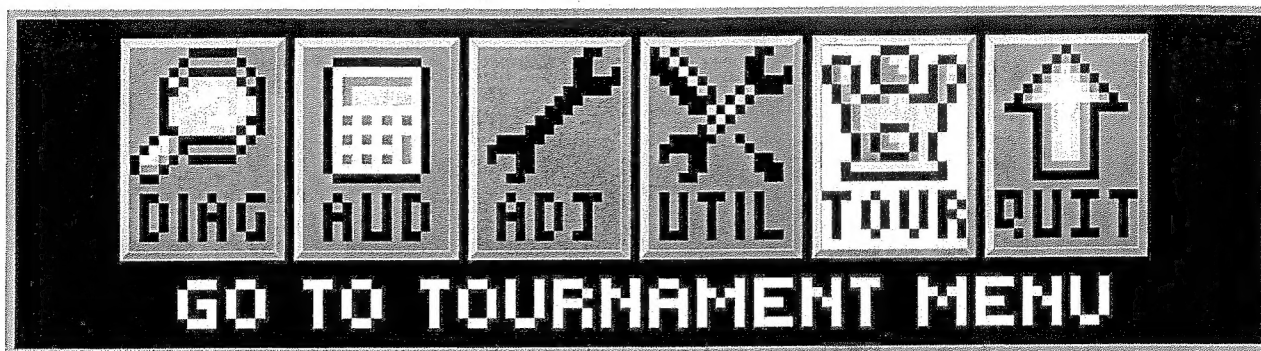
Dump Audits to USB

To initiate, from the **USB MENU**, select the "DUMP" *Icon*. Follow the on-screen prompts to perform a **Data Dump** (download). **Note:** *If Icon is not present, access via the Audits Menu, see the Audits Section.*



Backup to USB Memory Stick

To initiate, from the **USB MENU**, select the "BKUP" *Icon*. Follow the on-screen prompts to perform a **Backup** (game code only). This backup feature does not retain adjustments and/or settings changes made.



To initiate, from the **MAIN MENU**, select the "TOUR" *Icon*. The **TOURNAMENT MENU** provides ways to quickly and easily start and stop a tournament. Also, tournament data can be viewed (*audits, prize info, etc.*).

All **TOURNAMENT MENU** *Icons* and their usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some *Icons* may appear non-functional or may not appear at all. *Icons and/or functions, order and operation are subject to change.*

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [**BACK**], exit or escape, the **RED Buttons** to [**< / -**] HIGHLIGHT PREVIOUS or DECREASE / [**+ / >**] HIGHLIGHT NEXT or INCREASE to highlight the desired option, and the **BLACK Button** to [**SELECT**] it or activate.



T Start Tournament

To initiate, from the **TOURNAMENT MENU**, select the "STRT" *Icon*. The **START TOURNAMENT MENU** allows the operator to start a tournament. Select **QUICK START** or **CUSTOM** Tournament Start. For the first time Tournament Set-Up, it is recommended to select **CUSTOM**. Follow the on-screen prompts. After completion of all options in **QUICK START** or **CUSTOM**, the Tournament is started, the **START TOURNAMENT MENU** is exited and returns to the **TOURNAMENT MENU**.

QUICK START :

Increase or decrease the: • **DAYS, HOURS and MINUTES** • **PRIZE POOL \$ (DOLLAR) and ¢ (CENT) AMOUNT**
• **INCREMENT THE PRIZE POOL PER PLAY INCREASES \$ and ¢ AMOUNT**

CUSTOM START :

- Confirm the current date and time (*if it was not set previous via the UTILITIES MENU it can be set-up in this display as well*). Enter the **MONTH, DAY, YEAR and TIME**
- Choose the Tournament **Start Date: MONTH, DAY, YEAR and TIME**
- Choose the Tournament **End Date: MONTH, DAY, YEAR and TIME**
- Choose the **CREDITS** per play desired (01-10). Set the maximum number of *Credits* that may be accumulated per game. **Note:** *The current pricing is displayed; to change pricing GO TO THE ADJUSTMENTS MENU.*

Increase or decrease the: • **PRIZE POOL \$ (DOLLAR) and ¢ (CENT) AMOUNT**
• **INCREMENT THE PRIZE POOL PER PLAY INCREASES \$ and ¢ AMOUNT**
• **MAXIMUM (CAP) PRIZE POOL \$ and ¢ AMOUNT.**

- Increase or decrease the number of **PRIZES** (01-05 **HIGH SCORE**; 02-05 **B'N'W**). Set the maximum # of *Prize Positions* to be awarded during a Tournament. **Selections are as follows** (*% distribution cannot be changed*):

HIGH SCORE:					BUMP N' WIN:				
Set to 01	1 Winner	100% (1)	Prize Pool		Cannot set to 01. Minimum of 2 winners required.				
Set to 02	2 Winners	65% (1)	35% (2)		Set to 02	2 Winners	65% (1)	35% (2)	
Set to 03	3 Winners	50% (1)	30% (2)	20% (3)	Set to 03	3 Winners	50% (1)	25% (2)	25% (3)
Set to 04	4 Winners	50% (1)	25% (2)	15% (3)	10% (4)	Set to 04	4 Winners	40% (1)	20% (2)
Set to 05	5 Winners	50% (1)	20% (2)	15% (3)	10% (4)	5% (5)	Set to 05	5 Winners	40% (1)

- Select the **AWARD TYPE** (**CASH, POINTS, PRIZE, TICKETS** or **NONE**). Select **CASH** for the displays to represent the Prize Pool amount (*based on Jackpot Base and Max.*) in **\$Dollars**. Select **POINTS** for the display to represent the Prize Pool amount in **Points**. Select **PRIZE**, if applicable. Select **TICKET** for the display to represent the Prize Pool amount in **Tickets**. Select **NONE NOT TO** represent anything.

Custom Start continued on the next page.

POWER REQUIREMENTS



This game **must be connected to a properly grounded outlet to reduce shock hazard** and insure proper game operation. See the Yellow Pages (Schematics & Wiring), for transformer connections required for **Normal, High, and Low Line** conditions.



110v AC - 125v AC @ 60Hz		
Normal Line:	AVG OPERATION	MAX OPERATION
Domestic use an 8AMP 250v Slo-Blo Fuse.	CURRENT: 2.8AMP WATTAGE: 329w	CURRENT: 8AMP WATTAGE: 940w
High Line:	AVG OPERATION	MAX OPERATION
Export use 2x 5AMP 250v Slo-Blo Fuses. (*England & Hong Kong use an 8AMP 250v S/B Fuse.)	CURRENT: 1.8AMP WATTAGE: 412w	CURRENT: 5AMP 8AMP* WATTAGE: 1145w 1832w*
Low Line:	AVG OPERATION	MAX OPERATION
Export Japan Only use an 8AMP 250v Slo-Blo Fuse.	CURRENT: 2.6AMP WATTAGE: 264w	CURRENT: 8AMP WATTAGE: 812w

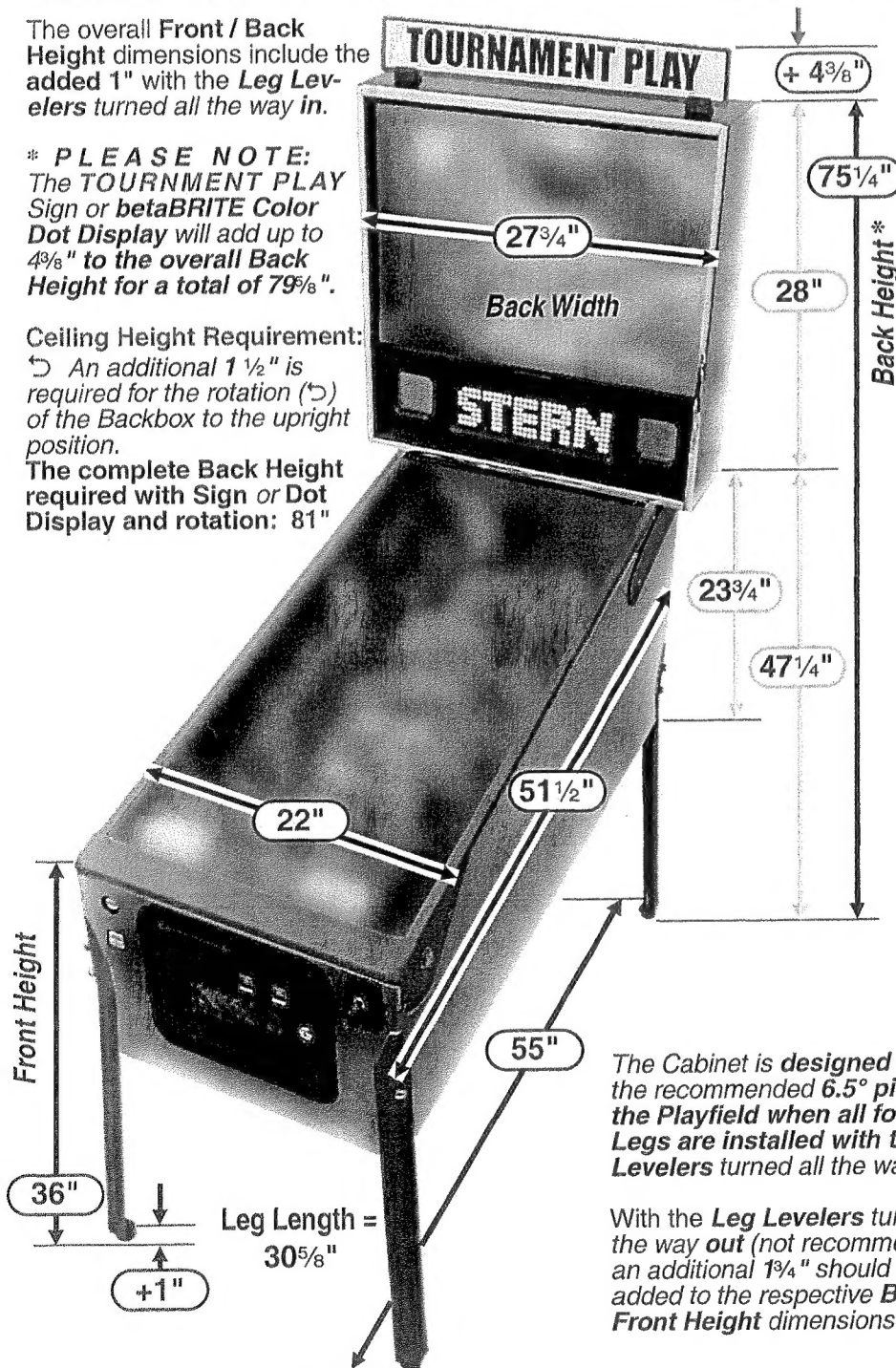
GAME DIMENSIONS

TRANSPORTATION

The overall Front / Back Height dimensions include the added 1" with the **Leg Levelers** turned all the way in.

*** PLEASE NOTE:**
The **TOURNMENT PLAY** Sign or **betaBRITE Color Dot Display** will add up to $4\frac{3}{8}"$ to the overall **Back Height** for a total of $79\frac{5}{8}"$.

Ceiling Height Requirement:
An additional $1\frac{1}{2}"$ is required for the rotation (↻) of the Backbox to the upright position.
The complete Back Height required with Sign or Dot Display and rotation: **81"**



The Cabinet is **designed** to give the recommended **6.5° pitch** to the Playfield when all four (4) Legs are installed with the **Leg Levelers** turned all the way in.

With the **Leg Levelers** turned all the way **out** (not recommended), an additional $1\frac{3}{4}"$ should be added to the respective **Back** or **Front Height** dimensions.

BEFORE TRANSPORTING



To reduce the possibility of damage, observe **ALL** precautions whenever transporting the game.

Read & follow the next page on How to Secure the Backbox for Transporting.
Remove the legs and secure the game within the transporting vehicle.

SAVE AND RETAIN ALL PRINTED INFORMATION INSIDE THE CABINET !

